M 1

```
BBBBBBBBBBBB        AAAAAAAAA        SSSSSSSSSSSS  RRRRRRRRRRRR     TTTTTTTTTTTTTT   LLL
BBBBBBBBBBBB        AAAAAAAAA        SSSSSSSSSSSS  RRRRRRRRRRRR     TTTTTTTTTTTTTT   LLL
BBBBBBBBBBBB        AAAAAAAAA        SSSSSSSSSSSS  RRRRRRRRRRRR     TTTTTTTTTTTTTT   LLL
BBB         BBB  AAA         AAA  SSS              RRR         RRR        TTT        LLL
BBB         BBB  AAA         AAA  SSS              RRR         RRR        TTT        LLL
BBB         BBB  AAA         AAA  SSS              RRR         RRR        TTT        LLL
BBB         BBB  AAA         AAA  SSS              RRR         RRR        TTT        LLL
BBB         BBB  AAA         AAA  SSS              RRR         RRR        TTT        LLL
BBBBBBBBBBBB     AAA         AAA     SSSSSSSSS     RRRRRRRRRRRR           TTT        LLL
BBBBBBBBBBBB     AAA         AAA     SSSSSSSSS     RRRRRRRRRRRR           TTT        LLL
BBBBBBBBBBBB     AAA         AAA     SSSSSSSSS     RRRRRRRRRRRR           TTT        LLL
BBB         BBB  AAAAAAAAAAAAAAA              SSS  RRR   RRR              TTT        LLL
BBB         BBB  AAAAAAAAAAAAAAA              SSS  RRR   RRR              TTT        LLL
BBB         BBB  AAAAAAAAAAAAAAA              SSS  RRR   RRR              TTT        LLL
BBB         BBB  AAA         AAA              SSS  RRR      RRR           TTT        LLL
BBB         BBB  AAA         AAA              SSS  RRR      RRR           TTT        LLL
BBB         BBB  AAA         AAA              SSS  RRR      RRR           TTT        LLL
BBBBBBBBBBBB     AAA         AAA  SSSSSSSSSSSS     RRR         RRR        TTT        LLLLLLLLLLLLLLL
BBBBBBBBBBBB     AAA         AAA  SSSSSSSSSSSS     RRR         RRR        TTT        LLLLLLLLLLLLLLL
BBBBBBBBBBBB     AAA         AAA  SSSSSSSSSSSS     RRR         RRR        TTT        LLLLLLLLLLLLLLL
```

```
                                        B 13
**FILE**ID**BASMATINI




BBBBBBBB      AAAAAA      SSSSSSSS  MM      MM    AAAAAA    TTTTTTTTTT    IIIIII    NN      NN    IIIIII
BBBBBBBB      AAAAAA      SSSSSSSS  MM      MM    AAAAAA    TTTTTTTTTT    IIIIII    NN      NN    IIIIII
BB      BB  AA      AA  SS          MMMM  MMMM  AA      AA      TT          II      NN      NN      II
BB      BB  AA      AA  SS          MMMM  MMMM  AA      AA      TT          II      NN      NN      II
BB      BB  AA      AA  SS          MM  MM  MM  AA      AA      TT          II      NNNN    NN      II
BB      BB  AA      AA  SS          MM  MM  MM  AA      AA      TT          II      NNNN    NN      II
BBBBBBBB    AA      AA    SSSSSS    MM      MM  AA      AA      TT          II      NN  NN  NN      II
BBBBBBBB    AA      AA    SSSSSS    MM      MM  AA      AA      TT          II      NN  NN  NN      II
BB      BB  AAAAAAAAAA          SS  MM      MM  AAAAAAAAAA      TT          II      NN    NNNN      II
BB      BB  AAAAAAAAAA          SS  MM      MM  AAAAAAAAAA      TT          II      NN    NNNN      II
BB      BB  AA      AA          SS  MM      MM  AA      AA      TT          II      NN      NN      II        ....
BB      BB  AA      AA          SS  MM      MM  AA      AA      TT          II      NN      NN      II        ....
BBBBBBBB    AA      AA  SSSSSSSS    MM      MM  AA      AA      TT        IIIIII    NN      NN    IIIIII      ....
BBBBBBBB    AA      AA  SSSSSSSS    MM      MM  AA      AA      TT        IIIIII    NN      NN    IIIIII      ....


LL            IIIIII      SSSSSSSS
LL            IIIIII      SSSSSSSS
LL              II      SS
LL              II      SS
LL              II      SS
LL              II      SS
LL              II        SSSSSS
LL              II        SSSSSS
LL              II              SS
LL              II              SS
LL              II              SS
LL              II              SS
LLLLLLLLLL    IIIIII    SSSSSSSS
LLLLLLLLLL    IIIIII    SSSSSSSS
```

Table of contents

```
0000            .TITLE  BAS$MAT_INIT
0000            .IDENT  /1-010/                 ; File: BASMATINI.MAR Edit: PLL1010
0000
0000    ;
0000    ;****************************************************************************
0000    ;*                                                                          *
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0000    ;*                                                                          *
0000    ;*                                                                          *
0000    ;****************************************************************************
0000    ;
0000
0000    ;++
0000    ; FACILITY: BASIC code support
0000    ;
0000    ; ABSTRACT:
0000    ;
0000    ;       This module initializes each element of a matrix to the input
0000    ;       constant.
0000    ;
0000    ; ENVIRONMENT: User Mode, AST Reentrant
0000    ;
0000    ;--
0000    ; AUTHOR: R. Will, CREATION DATE: 23-May-79
0000    ;
0000    ; MODIFIED BY:
0000    ;++
0000    ; 1-001 - Original
0000    ; 1-002 - Make references to bounds signed.  RW 7-Jun-79
0000    ; 1-003 - Add support for byte, g and h floating.  PLL 17-Sep-81
0000    ; 1-004 - Change shared external references to G^ RNH 25-Sep-81
0000    ; 1-005 - Substitute a macro for the calls to the store routines.
0000    ;         This should speed things up.  PLL 6-Nov-81
0000    ; 1-006 - STORE macro must handle g & h floating.  PLL 11-Nov-81
0000    ; 1-007 - Correct a run-time expression in the FETCH and STORE macros.
0000    ;         PLL 20-Jan-82
0000    ; 1-008 - Correct another bug in the STORE macro.  Does not compute
0000    ;         linear index for one dimensional arrays properly.  PLL 23-Feb-82
0000    ; 1-009 - Add code in mainline code to support arrays of descriptors.
0000    ;         LEB 28-JUN-1982.
0000    ; 1-010 - Change own storage to stack storage.  PLL 9-Jul-1982
```

```
                         0000    58 ;--
```

```
                  0000          .SBTTL  DECLARATIONS
                  0000  ;
                  0000  ; INCLUDE FILES:
                  0000  ;
                  0000
                  0000          $DSCDEF
                  0000          $SFDEF
                  0000
                  0000  ;
                  0000  ; EXTERNAL DECLARATIONS:
                  0000  ;
                  0000          .DSABL  GBL                             ; Prevent undeclared
                  0000                                                  ;  symbols from being
                  0000                                                  ;  automatically global.
                  0000          .EXTRN  BAS$K_ARGDONMAT                 ; signalled if all 3 blocks
                  0000                                                  ;  not present in array desc
                  0000                                                  ;  or dimct = 0
                  0000          .EXTRN  BAS$K_DATTYPERR                 ; signalled if dtype of array
                  0000                                                  ; isn't word long float double
                  0000          .EXTRN  BAS$STO_FA_B_R8                 ; array element store for byte
                  0000          .EXTRN  BAS$STO_FA_W_R8                 ; array element store for word
                  0000          .EXTRN  BAS$STO_FA_L_R8                 ; array element store for long
                  0000          .EXTRN  BAS$STO_FA_F_R8                 ; array element store - float
                  0000          .EXTRN  BAS$STO_FA_D_R8                 ; array element store - double
                  0000          .EXTRN  BAS$STO_FA_G_R8                 ; array element store - gfloat
                  0000          .EXTRN  BAS$STO_FA_H_R8                 ; array element store - hfloat
                  0000          .EXTRN  BAS$$SCALE_RT                   ; get the scale for double
                  0000          .EXTRN  BAS$$STOP                       ; signal fatal errors
                  0000          .EXTRN  BAS$STORE_BFA
                  0000
                  0000  ;
                  0000  ; MACROS:
                  0000  ;
                  0000
                  0000  ;       $BAS$MAT_INIT   see below, defines entire initialization algorithm
                  0000  ;       STORE           store an element into an array
                  0000
                  0000  ;
                  0000  ; EQUATED SYMBOLS:
                  0000  ;
                  0000
        00000000  0000          lower_bnd2 = 0                          ; stack offset for temp
        00000004  0000          lower_bnd1 = 4                          ; stack offset for temp
        00000008  0000          upper_bnd1 = 8                          ; stack offset for temp
        0000000C  0000          value_desc = 12                         ; output descriptor
        0000000C  0000          str_len = 12                            ; length field within desc
        0000000E  0000          dtype = 14                              ; data type field in desc
        0000000F  0000          class = 15                              ; class field in desc
        00000010  0000          pointer = 16                            ; pointer field in desc
        00000014  0000          data = 20                               ; data field (4 longwords)
        00000024  0000          constant_cvt = 36                       ; stack offset, converted const
                  0000                                                  ;  may be hfloat
        00000018  0000          dsc$l_l1_1 = 24                         ; desc offset if 1 sub
        0000001C  0000          dsc$l_u1_1 = 28                         ; desc offset if 1 sub
        0000001C  0000          dsc$l_l1_2 = 28                         ; desc offset if 2 sub
        00000020  0000          dsc$l_u1_2 = 32                         ; desc offset if 2 sub
        00000024  0000          dsc$l_l2_2 = 36                         ; desc offset if 2 sub
```

```
                         00000028  0000    117          dsc$l_u2_2 = 40                                 ; desc offset if 2 sub
                                   0000    118
                                   0000    119 ;
                                   0000    120 ; OWN STORAGE:
                                   0000    121 ;
                                   0000    122
                                   0000    123 ;        NONE
                                   0000    124
                                   0000    125 ;
                                   0000    126 ; PSECT DECLARATIONS:
                                   0000    127 ;
                               00000000    128          .PSECT _BAS$CODE PIC, USR, CON, REL, LCL, SHR, -
                                   0000    129                           EXE, RD, NOWRT, LONG
                                   0000    130
```

```
                 0000          .SBTTL  BAS$MAT_INIT  - Initialize a  matrix
                 0000    ;++
                 0000    ; FUNCTIONAL DESCRIPTION:
                 0000    ;
                 0000    ;       This routine initializes each element of a matrix to the
                 0000    ;       input constant.  The algorithm is the same for all the supported
                 0000    ;       BASIC data types.  In order to keep the code for all data types
                 0000    ;       the same and to simplify the reading, the code has been done as
                 0000    ;       a macro, which all the data types use varying only the letters
                 0000    ;       (B, W, L, F, D, G, H) in converting the constant, in passing the constant
                 0000    ;       and calling the array store routines.
                 0000    ;
                 0000    ; CALLING SEQUENCE:
                 0000    ;
                 0000    ;       CALL BASMAT_INIT (matrix.wx.da, constant.rl.v)
                 0000    ;
                 0000    ; INPUT PARAMETERS:
                 0000    ;
        00000008 0000           constant = 8
                 0000    ;
                 0000    ; IMPLICIT INPUTS:
                 0000    ;
                 0000    ;       NONE
                 0000    ;
                 0000    ; OUTPUT PARAMETERS:
                 0000    ;
        00000004 0000           matrix = 4
                 0000    ;
                 0000    ; IMPLICIT OUTPUTS:
                 0000    ;
                 0000    ;       NONE
                 0000    ;
                 0000    ; FUNCTION VALUE:
                 0000    ; COMPLETION CODES:
                 0000    ;
                 0000    ;       NONE
                 0000    ;
                 0000    ; SIDE EFFECTS:
                 0000    ;
                 0000    ;       This routine calls the BASIC matrix store routines, and may cause
                 0000    ;       any of their errors to be signalled.  It also may signal any of the
                 0000    ;       errors listed in the externals area.
                 0000    ;
                 0000    ;--
                 0000
                 0000
```

```
0000            .LIST   ME
0000            .MACRO  $BAS$MAT_INIT dtype                   ; initialize algorithm
0000
0000    ;+
0000    ;       REGISTER USAGE
0000    ;       R0 - R8 destroyed by store routines
0000    ;       R9      upper bound for 2nd subscript
0000    ;       R10     pointer to array descriptor
0000    ;       R11     current value of 2nd subscript
0000    ;-
0000
0000    ;+
0000    ; Set up limits for looping through all elements
0000    ;-
0000
0000            .IF     IDN     dtype, L
0000            .IFT                                          ; data type is long
0000            MOVL    constant(AP), -(SP)                   ; move constant
0000            .IFF                                          ; data type is not long
0000            CVTL'dtype'     constant(AP), -(SP)           ; make constant same datatype
0000                                                          ;  as array, save on stack
0000            .ENDC
0000            .IF     IDN     dtype, D                      ; if array is double
0000            MOVL    SF$L_SAVE_FP(FP), R0                  ; pass FP to get scale
0000            JSB     G^BAS$$SCALE_R1                       ; get scale in R0 & R1
0000                                                          ; call a BLISS routine because
0000                                                          ; the frame offsets are only
0000                                                          ; defined for BLISS
0000            MULD2   R0, (SP)                              ; scale
0000            .ENDC
0000
0000    ;+
0000    ; Allocate data and value_desc on the stack.  This applies to both
0000    ; one and two dimensions.
0000    ;-
0000
0000            CLRQ    -(SP)                                 ; space for data
0000            CLRQ    -(SP)                                 ;  may be hfloat
0000            CLRQ    -(SP)                                 ; space for value_desc
0000
0000            CMPB    DSC$B_DIMCT(R10), #1                  ; determine # of subscripts
0000            BEQLU   INIT_ONE_SUB'dtype'                   ; 1 sub, go init
0000            BGTRU   INIT_TWO_SUBS'dtype'                  ; >=2 subs, go init
0000            BRW     ERR_ARGDONMAT                         ; 0 subs, error
0000
0000    ;+
0000    ; There is only 1 subscript.  Make both upper and lower bound for 2nd
0000    ; subscript a 1.  The second subscript will be passed to and ignored by the
0000    ; store routine.
0000    ;-
0000
0000    INIT_ONE_SUB'dtype':
0000            PUSHL   dsc$l_u1_1(R10)                       ; 1st upper bound
0000            PUSHL   dsc$l_l1_1(R10)                       ; 1st lower bound
0000            BGTR    1$                                    ; not 0 or neg, do 2nd sub
0000            MOVL    #1, (SP)                              ; don't alter col 0
0000    1$:     MOVL    #1, R9                                ; dummy 2nd lower bound
```

```
0000            PUSHL   #1                                      ; dummy 2nd upper bound
0000            BRB     LOOP_2ND_SUB'dtype'                     ; go loop
0000
0000    ;+
0000    ; There are 2 subscripts.  Put the upper bound for both subscripts on the
0000    ; stack and make sure that the lower bound for both subscripts will start
0000    ; at 1 (do not alter row or col 0)
0000    ;-
0000
0000    INIT_TWO_SUBS'dtype':
0000            PUSHL   dsc$l_u1_2(R10)                         ; 1st upper bound
0000            PUSHL   dsc$l_l1_2(R10)                         ; 1st lower bound
0000            BGTR    1$                                      ; not row 0 or neg, do cols
0000            MOVL    #1, (SP)                                ; start with row 1
0000    1$:     MOVL    dsc$l_u2_2(R10), R9                     ; 2nd upper bound
0000            PUSHL   dsc$l_l2_2(R10)                         ; 2nd lower bound
0000            BGTR    LOOP_1ST_SUB'dtype'                     ; not col 0, go loop
0000            MOVL    #1, (SP)                                ; start with col 1
0000
0000    ;+
0000    ; Loop through all the rows.  Row and column upper and lower bounds have been
0000    ; initialized on the stack.
0000    ;-
0000
0000    LOOP_1ST_SUB'dtype':
0000            MOVL    lower_bnd2(SP), R11                     ; R11 has 2nd lower bound
0000
0000    ;+
0000    ; Loop through all the elements (columns) of the current row.  Column lower
0000    ; bound is initialized in R11.  Column upper bound is on the stack.
0000    ; Distinguish array by data type so that the correct store routine can be
0000    ; called and the constant can be converted to the correct type.
0000    ;-
0000
0000    LOOP_2ND_SUB'dtype':
0000
0000            MOV'dtype'      constant_cvt(SP), R0    ; put constant into R0
0000                                                    ;  R0 & R1 for double
0000    ;+
0000    ; When passed by value, hfloat takes 4 words, gfloat and double take 2 words,
0000    ; and all other data types take 1 longword.
0000    ;-
0000
0000            .IF     IDN     dtype, H                        ; data type is hfloat
0000            MOVL    R10, R4                                 ; pointer to array desc
0000            MOVL    lower_bnd1(SP), R5                      ; current row
0000            MOVL    R11, R6                                 ; current column
0000            .IFF
0000            .IF     IDN     dtype, G                        ; data type is gfloat
0000            MOVL    R10, R2                                 ; pointer to array desc
0000            MOVL    lower_bnd1(SP), R3                      ; current row
0000            MOVL    R11, R4                                 ; current column
0000            .IFF
0000            .IF     IDN     dtype, D                        ; data type is double
0000            MOVL    R10, R2                                 ; pointer to array desc
0000            MOVL    lower_bnd1(SP), R3                      ; current row
0000            MOVL    R11, R4                                 ; current column
```

```
    0000                .IFF                                            ; all other data types
    0000                MOVL    R10, R1                                 ; pointer to array desc
    0000                MOVL    lower_bnd1(SP), R2                      ; current row
    0000                MOVL    R11, R3                                 ; current column
    0000                .ENDC
    0000                .ENDC
    0000                .ENDC
    0000                MOV'dtype'      R0, data(SP)                    ; store value in value_desc
    0000                STORE   'dtype'                                 ; store in array
    0000                INCL    R11                                     ; get next column
    0000                CMPL    R11, R9                                 ; see if last column done
    0000                BGTR    2$
    0000                BRW     LOOP_2ND_SUB'dtype'                     ; no, continue inner loop
    0000
    0000        ;+
    0000        ; Have completed entire row.  See if it was the last row.  If not,
    0000        ; continue with next row.
    0000        ;-
    0000
    0000        2$:     INCL    lower_bnd1(SP)                          ; get next row
    0000                CMPL    lower_bnd1(SP), upper_bnd1(SP)          ; see if last row done
    0000                BGTR    3$
    0000                BRW     LOOP_1ST_SUB'dtype'                     ; no, continue outer loop
    0000
    0000        3$:     RET                                             ; yes, finished
    0000                .ENDM
```

```
                        4FFC  0000        .ENTRY BAS$MAT_INIT , ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11,IV>
                              0002
                              0002  ;+
                              0002  ; Put routine arguments into registers for ease of use.
                              0002  ; If block 2 of array descriptor (multipliers) is not present then error.
                              0002  ;-
                              0002
            5A   04 AC    D0  0002        MOVL    matrix(AP), R10                  ; ptr to array descr in R10
        3F 0A AA   07     E1  0006        BBC     #DSC$V_FL_BOUNDS, DSC$B_AFLAGS(R10), ERR_ARGDONMAT
                              000B                                             ; exit if block 3 not
                              000B                                             ; present in descriptor
                              000B
                              000B  ;+
                              000B  ; Algorithm now differs according to data types
                              000B  ;-
                              000B
                55   5A   D0  000B        MOVL    R10, R5                          ; save original pointer
       05   06   02 A5    8F  000E  4$:   CASEB   DSC$B_DTYPE(R5), #DSC$K_DTYPE_B, #<DSC$K_DTYPE_D - DSC$K_DTYPE_B>
                       0044'  0013  1$:   .WORD   BYTE-1$                          ; code for byte dtype
                       0180'  0015        .WORD   WORD-1$                          ; code for word dtype
                       02BC'  0017        .WORD   LONG-1$                          ; code for long dtype
                       002A'  0019        .WORD   ERR_DATTYPERR-1$                 ; quad not supported
                       03F8'  001B        .WORD   FLOAT-1$                         ; code for float dtype
                       0534'  001D        .WORD   DOUBLE-1$                        ; code for double dtype
                              001F
                              001F  ;+
                              001F  ; G and H floating fall outside the range of the CASEB.
                              001F  ;-
                              001F
            1B   02 A5    91  001F        CMPB    DSC$B_DTYPE(R5), #DSC$K_DTYPE_G
                    03    12  0023        BNEQ    2$
                  0668    31  0025        BRW     GFLOAT                           ; code for gfloat dtype
                              0028
            1C   02 A5    91  0028  2$:   CMPB    DSC$B_DTYPE(R5), #DSC$K_DTYPE_H
                    03    12  002C        BNEQ    3$
                  07A2    31  002E        BRW     HFLOAT
                              0031
            18   02 A5    91  0031  3$:   CMPB    DSC$B_DTYPE(R5), #DSC$K_DTYPE_DSC
                    06    12  0035        BNEQ    ERR_DATTYPERR
            55   04 A5    D0  0037        MOVL    4(R5), R5                        ; R5 <-- addr of desc
                    D1    11  003B        BRB     4$                               ; CASE again on dtype in desc
                              003D
                              003D  ERR_DATTYPERR:
          00000000'8F     DD  003D        PUSHL   #BAS$K_DATTYPERR                 ; Signal error, unsupported
      00000000'GF    01   FB  0043        CALLS   #1, G^BAS$$STOP                  ; dtype in array desc
                              004A
                              004A  ERR_ARGDONMAT:
          00000000'8F     DD  004A        PUSHL   #BAS$K_ARGDONMAT                 ; signal error, 0 for dimct
      00000000'GF    01   FB  0050        CALLS   #1, G^BAS$$STOP                  ; or block 2 or 3 absent
                              0057
```

```
                         0057   371 BYTE:   $BAS$MAT_INIT B                                 ; expand to byte operations
                         0057
                         0057           ;+
                         0057           ;       REGISTER USAGE
                         0057           ;       R0 - R8 destroyed by store routines
                         0057           ;       R9      upper bound for 2nd subscript
                         0057           ;       R10     pointer to array descriptor
                         0057           ;       R11     current value of 2nd subscript
                         0057           ;-
                         0057
                         0057           ;+
                         0057           ; Set up limits for looping through all elements
                         0057           ;-
                         0057
                         0057                   .IF     IDN     B, L
                         0057                   .IFT                                            ; data type is long
                         0057                   MOVL    constant(AP), -(SP)                     ; move constant
                         0057                   .IFF                                            ; data type is not long
   7E    08 AC      F6   0057                   CVTLB   constant(AP), -(SP)     ; make constant same datatype
                         005B                                                                   ;  as array, save on stack
                         005B                   .ENDC
                         005B                   .IF     IDN     B, D            ; if array is double
                         005B                   MOVL    SF$L_SAVE_FP(FP), R0                    ; pass FP to get scale
                         005B                   JSB     G^BAS$$SCALE_R1                         ; get scale in R0 & R1
                         005B                                                                   ; call a BLISS routine because
                         005B                                                                   ; the frame offsets are only
                         005B                                                                   ; defined for BLISS
                         005B                   MULD2   R0, (SP)                                ; scale
                         005B                   .ENDC
                         005B
                         005B           ;+
                         005B           ; Allocate data and value_desc on the stack.  This applies to both
                         005B           ; one and two dimensions.
                         005B           ;-
                         005B
            7E      7C   005B                   CLRQ    -(SP)                                   ; space for data
            7E      7C   005D                   CLRQ    -(SP)                                   ;  may be hfloat
            7E      7C   005F                   CLRQ    -(SP)                                   ; space for value_desc
                         0061
   01    0B AA      91   0061                   CMPB    DSC$B_DIMCT(R10), #1                    ; determine # of subscripts
            05      13   0065                   BEQLU   INIT_ONE_SUBB           ; 1 sub, go init
            15      1A   0067                   BGTRU   INIT_TWO_SUBSB          ; >=2 subs, go init
          FFDE      31   0069                   BRW     ERR_ARGDONMAT                           ; 0 subs, error
                         006C
                         006C           ;+
                         006C           ; There is only 1 subscript.  Make both upper and lower bound for 2nd
                         006C           ; subscript a 1.  The second subscript will be passed to and ignored by the
                         006C           ; store routine.
                         006C           ;-
                         006C
                         006C           INIT_ONE_SUBB:
         1C AA      DD   006C                   PUSHL   dsc$l_u1_1(R10)                         ; 1st upper bound
         18 AA      DD   006F                   PUSHL   dsc$l_l1_1(R10)                         ; 1st lower bound
            03      14   0072                   BGTR    1$                                      ; not 0 or neg, do 2nd sub
      6E    01      D0   0074                   MOVL    #1, (SP)                                ; don't alter col 0
      59    01      D0   0077           1$:     MOVL    #1, R9                                  ; dummy 2nd lower bound
            01      DD   007A                   PUSHL   #1                                      ; dummy 2nd upper bound
```

```
           1A   11  007C            BRB     LOOP_2ND_SUBB           ; go loop
                    007E
                    007E    ;+
                    007E    ; There are 2 subscripts.  Put the upper bound for both subscripts on the
                    007E    ; stack and make sure that the lower bound for both subscripts will start
                    007E    ; at 1 (do not alter row or col 0)
                    007E    ;-
                    007E
                    007E    INIT_TWO_SUBSB:
         20 AA   DD 007E            PUSHL   dsc$l_u1_2(R10)                         ; 1st upper bound
         1C AA   DD 0081            PUSHL   dsc$l_l1_2(R10)                         ; 1st lower bound
            03   14 0084            BGTR    1$                                      ; not row 0 or neg, do cols
      6E    01   D0 0086            MOVL    #1, (SP)                                ; start with row 1
  59     28 AA   D0 0089    1$:     MOVL    dsc$l_u2_2(R10), R9                     ; 2nd upper bound
         24 AA   DD 008D            PUSHL   dsc$l_l2_2(R10)                         ; 2nd lower bound
            03   14 0090            BGTR    LOOP_TST_SUBB           ; not col 0, go loop
      6E    01   D0 0092            MOVL    #1, (SP)                                ; start with col 1
                    0095
                    0095    ;+
                    0095    ; Loop through all the rows.  Row and column upper and lower bounds have been
                    0095    ; initialized on the stack.
                    0095    ;-
                    0095
                    0095    LOOP_1ST_SUBB:
      5B    6E   D0 0095            MOVL    lower_bnd2(SP), R11                     ; R11 has 2nd lower bound
                    0098
                    0098    ;+
                    0098    ; Loop through all the elements (columns) of the current row.  Column lower
                    0098    ; bound is initialized in R11.  Column upper bound is on the stack.
                    0098    ; Distinguish array by data type so that the correct store routine can be
                    0098    ; called and the constant can be converted to the correct type.
                    0098    ;-
                    0098
                    0098    LOOP_2ND_SUBB:
                    0098
  50     24 AE   90 0098            MOVB    constant_cvt(SP), R0    ; put constant into R0
                    009C                                                    ;  R0 & R1 for double
                    009C    ;+
                    009C    ; When passed by value, hfloat takes 4 words, gfloat and double take 2 words,
                    009C    ; and all other data types take 1 longword.
                    009C    ;-
                    009C
                    009C            .IF     IDN     B, H            ; data type is hfloat
                    009C            MOVL    R10, R4                                 ; pointer to array desc
                    009C            MOVL    lower_bnd1(SP), R5                      ; current row
                    009C            MOVL    R11, R6                                 ; current column
                    009C            .IFF
                    009C            .IF     IDN     B, G            ; data type is gfloat
                    009C            MOVL    R10, R2                                 ; pointer to array desc
                    009C            MOVL    lower_bnd1(SP), R3                      ; current row
                    009C            MOVL    R11, R4                                 ; current column
                    009C            .IFF
                    009C            .IF     IDN     B, D            ; data type is double
                    009C            MOVL    R10, R2                                 ; pointer to array desc
                    009C            MOVL    lower_bnd1(SP), R3                      ; current row
                    009C            MOVL    R11, R4                                 ; current column
                    009C            .IFF                                            ; all other data types
```

```
                  51    5A   D0  009C               MOVL    R10, R1                         ; pointer to array desc
              52    04  AE   D0  009F               MOVL    lower_bnd1(SP), R2              ; current row
                  53    5B   D0  00A3               MOVL    R11, R3                         ; current column
                                 00A6               .ENDC
                                 00A6               .ENDC
                                 00A6               .ENDC
              14  AE    50   90  00A6               MOVB    R0, data(SP)            ; store value in value_desc
                                 00AA               STORE   B                               ; store in array
                                 00AA               .IF     IDN     B, H
                                 00AA               CMPB    dsc$b_dtype(R4), #dsc$k_dtype_dsc
                                 00AA               BNEQ    30009$
                                 00AA               MOVL    4(R4), R0
                                 00AA               MOVB    dsc$b_dtype(R0), dtype(SP)
                                 00AA               MOVB    dsc$b_class(R0), class(SP)
                                 00AA               MOVAL   data(SP), pointer (SP)
                                 00AA               MOVW    #10, str_len(SP)
                                 00AA               CMPB    dsc$b_dimct(R4), #1
                                 00AA               BNEQ    30011$
                                 00AA               PUSHL   R5
                                 00AA               PUSHL   R4
                                 00AA               PUSHAL  value_desc+8(SP)
                                 00AA               CALLS   #3,G^BAS$STORE_BFA
                                 00AA               BRW     30008$
                                 00AA      30011$:  PUSHL   R6
                                 00AA               PUSHL   R5
                                 00AA               PUSHL   R4
                                 00AA               PUSHAL  value_desc+12(SP)
                                 00AA               CALLS   #4,G^BAS$STORE_BFA
                                 00AA               BRW     30008$
                                 00AA      30009$:  CMPB    dsc$b_class(R4), #dsc$k_class_bfa
                                 00AA               BNEQ    30000$
                                 00AA               JSB     G^BAS$STO_FA_B_R8
                                 00AA               BRW     30008$
                                 00AA      30000$:  BBS     #5, 10(R4), 30001$
                                 00AA               CMPB    dsc$b_dimct(R4), #1
                                 00AA               BNEQ    30010$
                                 00AA               MOVZWL  dsc$w_length(R4), R8
                                 00AA               INDEX   R5, dsc$l_l1_1(R4), dsc$l_u1_1(R4), R8, #0, R7
                                 00AA               ADDL    dsc$a_a0(R4), R7
                                 00AA               MOVB    R0, (R7)
                                 00AA               BRW     30008$
                                 00AA      30010$:  INDEX   R5, dsc$l_l1_2(R4), dsc$l_u1_2(R4), dsc$l_m2(R4), #0, R7
                                 00AA               MOVZWL  dsc$w_length(R4), R8
                                 00AA               INDEX   R6, dsc$l_l2_2(R4), dsc$l_u2_2(R4), R8, R7, R7
                                 00AA               ADDL    dsc$a_a0(R4), R7
                                 00AA               MOVB    R0, (R7)
                                 00AA               BRW     30008$
                                 00AA      30001$:  CMPB    dsc$b_dimct(R4), #1
                                 00AA               BNEQ    30012$
                                 00AA               MOVZWL  dsc$w_length(R4), R8
                                 00AA               INDEX   R6, dsc$l_l1_1(R4), dsc$l_u1_1(R4), R8, #0, R7
                                 00AA               ADDL    dsc$a_a0(R4), R7
                                 00AA               MOVB    R0, (R7)
                                 00AA               BRW     30008$
                                 00AA      30012$:  INDEX   R6, dsc$l_l2_2(R4), dsc$l_u2_2(R4), dsc$l_m1(R4), #0, R7
                                 00AA               MOVZWL  dsc$w_length(R4), R8
                                 00AA               INDEX   R5, dsc$l_l1_2(R4), dsc$l_u1_2(R4), R8, R7, R7
```

```
        00AA                    ADDL    dsc$a_a0(R4), R7
        00AA                    MOVB    R0, (R7)
        00AA                    .IFF
        00AA                    .IF     IDN     B, G
        00AA                    CMPB    dsc$b_dtype(R2), #dsc$k_dtype_dsc
        00AA                    BNEQ    30013$
        00AA                    MOVL    4(R2), R0
        00AA                    MOVB    dsc$b_dtype(R0), dtype(SP)
        00AA                    MOVB    dsc$b_class(R0), class(SP)
        00AA                    MOVAL   data(SP), pointer (SP)
        00AA                    MOVW    #10, str_len(SP)
        00AA                    CMPB    dsc$b_dimct(R2), #1
        00AA                    BNEQ    30015$
        00AA                    PUSHL   R3
        00AA                    PUSHL   R2
        00AA                    PUSHAL  value_desc+8(SP)
        00AA                    CALLS   #3,G^BAS$STORE_BFA
        00AA                    BRW     30008$
        00AA            30015$: PUSHL   R4
        00AA                    PUSHL   R3
        00AA                    PUSHL   R2
        00AA                    PUSHAL  value_desc+12(SP)
        00AA                    CALLS   #4,G^BAS$STORE_BFA
        00AA                    BRW     30008$
        00AA            30013$: CMPB    dsc$b_class(R2), #dsc$k_class_bfa
        00AA                    BNEQ    30002$
        00AA                    JSB     G^BAS$STO_FA_B_R8
        00AA                    BRW     30008$
        00AA            30002$: BBS     #5, 10(R2), 30003$
        00AA                    CMPB    dsc$b_dimct(R2), #1
        00AA                    BNEQ    30014$
        00AA                    MOVZWL  dsc$w_length(R2), R6
        00AA                    INDEX   R3, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
        00AA                    ADDL    dsc$a_a0(R2), R5
        00AA                    MOVB    R0, (R5)
        00AA                    BRW     30008$
        00AA            30014$: INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), dsc$l_m2(R2), #0, R5
        00AA                    MOVZWL  dsc$w_length(R2), R6
        00AA                    INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), R6, R5, R5
        00AA                    ADDL    dsc$a_a0(R2), R5
        00AA                    MOVB    R0, (R5)
        00AA                    BRW     30008$
        00AA            30003$: CMPB    dsc$b_dimct(R2), #1
        00AA                    BNEQ    30016$
        00AA                    MOVZWL  dsc$w_length(R2), R6
        00AA                    INDEX   R4, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
        00AA                    ADDL    dsc$a_a0(R2), R5
        00AA                    MOVB    R0, (R5)
        00AA                    BRW     30008$
        00AA            30016$: INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), dsc$l_m1(R2), #0, R5
        00AA                    MOVZWL  dsc$w_length(R2), R6
        00AA                    INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), R6, R5, R5
        00AA                    ADDL    dsc$a_a0(R2), R5
        00AA                    MOVB    R0, (R5)
        00AA                    .IFF
        00AA                    .IF     IDN     B, D
        00AA                    CMPB    dsc$b_dtype(R2), #dsc$k_dtype_dsc
```

```
                            00AA              BNEQ    30017$
                            00AA              MOVL    4(R2), R0
                            00AA              MOVB    dsc$b_dtype(R0), dtype(SP)
                            00AA              MOVB    dsc$b_class(R0), class(SP)
                            00AA              MOVAL   data(SP), pointer (SP)
                            00AA              MOVW    #10, str_len(SP)
                            00AA              CMPB    dsc$b_dimct(R2), #1
                            00AA              BNEQ    30019$
                            00AA              PUSHL   R3
                            00AA              PUSHL   R2
                            00AA              PUSHAL  value_desc+8(SP)
                            00AA              CALLS   #3,G^BAS$STORE_BFA
                            00AA              BRW     30008$
                            00AA      30019$: PUSHL   R4
                            00AA              PUSHL   R3
                            00AA              PUSHL   R2
                            00AA              PUSHAL  value_desc+12(SP)
                            00AA              CALLS   #4,G^BAS$STORE_BFA
                            00AA              BRW     30008$
                            00AA      30017$: CMPB    dsc$b_class(R2), #dsc$k_class_bfa
                            00AA              BNEQ    30004$
                            00AA              JSB     G^BAS$STO_FA_B_R8
                            00AA              BRW     30008$
                            00AA      30004$: BBS     #5, 10(R2), 30005$
                            00AA              CMPB    dsc$b_dimct(R2), #1
                            00AA              BNEQ    30018$
                            00AA              MOVZWL  dsc$w_length(R2), R6
                            00AA              INDEX   R3, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                            00AA              ADDL    dsc$a_a0(R2), R5
                            00AA              MOVB    R0, (R5)
                            00AA              BRW     30008$
                            00AA      30018$: INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), dsc$l_m2(R2), #0, R5
                            00AA              MOVZWL  dsc$w_length(R2), R6
                            00AA              INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), R6, R5, R5
                            00AA              ADDL    dsc$a_a0(R2), R5
                            00AA              MOVB    R0, (R5)
                            00AA              BRW     30008$
                            00AA      30005$: CMPB    dsc$b_dimct(R2), #1
                            00AA              BNEQ    30020$
                            00AA              MOVZWL  dsc$w_length(R2), R6
                            00AA              INDEX   R4, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                            00AA              ADDL    dsc$a_a0(R2), R5
                            00AA              MOVB    R0, (R5)
                            00AA              BRW     30008$
                            00AA      30020$: INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), dsc$l_m1(R2), #0, R5
                            00AA              MOVZWL  dsc$w_length(R2), R6
                            00AA              INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), R6, R5, R5
                            00AA              ADDL    dsc$a_a0(R2), R5
                            00AA              MOVB    R0, (R5)
                            00AA              .IFF
      18    02 A1      91   00AA              CMPB    dsc$b_dtype(R1), #dsc$k_dtype_dsc
               41      12   00AE              BNEQ    30021$
      50    04 A1      D0   00B0              MOVL    4(R1), R0
   0E AE    02 A0      90   00B4              MOVB    dsc$b_dtype(R0), dtype(SP)
   0F AE    03 A0      90   00B9              MOVB    dsc$b_class(R0), class(SP)
   10 AE    14 AE      DE   00BE              MOVAL   data(SP), pointer (SP)
      0C AE    0A      B0   00C3              MOVW    #10, str_len(SP)
```

```
                     01    0B A1   91  00C7            CMPB    dsc$b_dimct(R1), #1
                              11   12  00CB            BNEQ    30023$
                              52   DD  00CD            PUSHL   R2
                              51   DD  00CF            PUSHL   R1
                           14 AE   DF  00D1            PUSHAL  value_desc+8(SP)
             00000000'GF      03   FB  00D4            CALLS   #3,G^BAS$STORE_BFA
                            009D   31  00DB            BRW     30008$
                              53   DD  00DE   30023$:  PUSHL   R3
                              52   DD  00E0            PUSHL   R2
                              51   DD  00E2            PUSHL   R1
                           18 AE   DF  00E4            PUSHAL  value_desc+12(SP)
             00000000'GF      04   FB  00E7            CALLS   #4,G^BAS$STORE_BFA
                            008A   31  00EE            BRW     30008$
                  BF BF    03 A1   91  00F1   30021$:  CMPB    dsc$b_class(R1), #dsc$k_class_bfa
                              09   12  00F6            BNEQ    30006$
                     00000000'GF   16  00F8            JSB     G^BAS$STO_FA_B_R8
                            007A   31  00FE            BRW     30008$
                  3C 0A A1    05   E0  0101   30006$:  BBS     #5, 10(R1), 30007$
                     01    0B A1   91  0106            CMPB    dsc$b_dimct(R1), #1
                              16   12  010A            BNEQ    30022$
                         55   61   3C  010C            MOVZWL  dsc$w_length(R1), R5
  00    55    1C A1    18 A1  52   0A  010F            INDEX   R2, dsc$l_l1_1(R1), dsc$l_u1_1(R1), R5, #0, R4
                              54       0117
                     54    10 A1   C0  0118            ADDL    dsc$a_a0(R1), R4
                         64   50   90  011C            MOVB    R0, (R4)
                            0059   31  011F            BRW     30008$
   18 A1    20 A1    1C A1    52   0A  0122   30022$:  INDEX   R2, dsc$l_l1_2(R1), dsc$l_u1_2(R1), dsc$l_m2(R1), #0, R4
                         54   00       012A
                         55   61   3C  012C            MOVZWL  dsc$w_length(R1), R5
  54    55    28 A1    24 A1  53   0A  012F            INDEX   R3, dsc$l_l2_2(R1), dsc$l_u2_2(R1), R5, R4, R4
                              54       0137
                     54    10 A1   C0  0138            ADDL    dsc$a_a0(R1), R4
                         64   50   90  013C            MOVB    R0, (R4)
                            0039   31  013F            BRW     30008$
                     01    0B A1   91  0142   30007$:  CMPB    dsc$b_dimct(R1), #1
                              16   12  0146            BNEQ    30024$
                         55   61   3C  0148            MOVZWL  dsc$w_length(R1), R5
  00    55    1C A1    18 A1  53   0A  014B            INDEX   R3, dsc$l_l1_1(R1), dsc$l_u1_1(R1), R5, #0, R4
                              54       0153
                     54    10 A1   C0  0154            ADDL    dsc$a_a0(R1), R4
                         64   50   90  0158            MOVB    R0, (R4)
                            001D   31  015B            BRW     30008$
   14 A1    28 A1    24 A1    53   0A  015E   30024$:  INDEX   R3, dsc$l_l2_2(R1), dsc$l_u2_2(R1), dsc$l_m1(R1), #0, R4
                         54   00       0166
                         55   61   3C  0168            MOVZWL  dsc$w_length(R1), R5
  54    55    20 A1    1C A1  52   0A  016B            INDEX   R2, dsc$l_l1_2(R1), dsc$l_u1_2(R1), R5, R4, R4
                              54       0173
                     54    10 A1   C0  0174            ADDL    dsc$a_a0(R1), R4
                         64   50   90  0178            MOVB    R0, (R4)
                                       017B            .ENDC
                                       017B            .ENDC
                                       017B            .ENDC
                                       017B   30008$:
                                       017B
                              5B   D6  017B            INCL    R11                                        ; get next column
                         59   5B   D1  017D            CMPL    R11, R9                                    ; see if last column done
                              03   14  0180            BGTR    2$
                  FF13    31  0182             BRW     LOOP_2ND_SUBB           ; no, continue inner loop
                              0185
                              0185     ;+
                              0185     ; Have completed entire row.  See if it was the last row.  If not,
                              0185     ; continue with next row.
                              0185     ;-
                              0185
                 04 AE    D6  0185     2$:     INCL    lower_bnd1(SP)                  ; get next row
          08 AE  04 AE    D1  0188             CMPL    lower_bnd1(SP), upper_bnd1(SP)  ; see if last row done
                    03    14  018D             BGTR    3$
                  FF03    31  018F             BRW     LOOP_1ST_SUBB           ; no, continue outer loop
                              0192
                          04  0192     3$:     RET                                     ; yes, finished
                              0193
                    0193   373 WORD:   $BAS$MAT_INIT W                              ; expand to word operations
                    0193
                    0193       ;+
                    0193       ;          REGISTER USAGE
                    0193       ;          R0 - R8 destroyed by store routines
                    0193       ;          R9      upper bound for 2nd subscript
                    0193       ;          R10     pointer to array descriptor
                    0193       ;          R11     current value of 2nd subscript
                    0193       ;-
                    0193
                    0193       ;+
                    0193       ; Set up limits for looping through all elements
                    0193       ;-
                    0193
                    0193               .IF     IDN     W, L
                    0193               .IFT                                         ; data type is long
                    0193               MOVL    constant(AP), -(SP)                  ; move constant
                    0193               .IFF                                         ; data type is not long
7E    08 AC   F7    0193               CVTLW   constant(AP), -(SP)     ; make constant same datatype
                    0197                                                            ;  as array, save on stack
                    0197               .ENDC
                    0197               .IF     IDN     W, D            ; if array is double
                    0197               MOVL    SF$L_SAVE_FP(FP), R0                 ; pass FP to get scale
                    0197               JSB     G^BAS$$SCALE_R1                      ; get scale in R0 & R1
                    0197                                                            ; call a BLISS routine because
                    0197                                                            ; the frame offsets are only
                    0197                                                            ; defined for BLISS
                    0197               MULD2   R0, (SP)                             ; scale
                    0197               .ENDC
                    0197
                    0197       ;+
                    0197       ; Allocate data and value_desc on the stack.  This applies to both
                    0197       ; one and two dimensions.
                    0197       ;-
                    0197
           7E   7C  0197               CLRQ    -(SP)                                ; space for data
           7E   7C  0199               CLRQ    -(SP)                                ;  may be hfloat
           7E   7C  019B               CLRQ    -(SP)                                ; space for value_desc
                    019D
01    0B AA   91    019D               CMPB    DSC$B_DIMCT(R10), #1                 ; determine # of subscripts
           05   13  01A1               BEQLU   INIT_ONE_SUBW           ; 1 sub, go init
           15   1A  01A3               BGTRU   INIT_TWO_SUBSW          ; >=2 subs, go init
         FEA2   31  01A5               BRW     ERR_ARGDONMAT                        ; 0 subs, error
                    01A8
                    01A8       ;+
                    01A8       ; There is only 1 subscript.  Make both upper and lower bound for 2nd
                    01A8       ; subscript a 1.  The second subscript will be passed to and ignored by the
                    01A8       ; store routine.
                    01A8       ;-
                    01A8
                    01A8       INIT_ONE_SUBW:
        1C AA   DD  01A8               PUSHL   dsc$l_u1_1(R10)                      ; 1st upper bound
        18 AA   DD  01AB               PUSHL   dsc$l_l1_1(R10)                      ; 1st lower bound
           03   14  01AE               BGTR    1$                                   ; not 0 or neg, do 2nd sub
      6E   01   D0  01B0               MOVL    #1, (SP)                             ; don't alter col 0
      59   01   D0  01B3       1$:     MOVL    #1, R9                               ; dummy 2nd lower bound
           01   DD  01B6               PUSHL   #1                                   ; dummy 2nd upper bound
```

```
              1A   11  01B8             BRB     LOOP_2ND_SUBW           ; go loop
                       01BA
                       01BA     ;+
                       01BA     ; There are 2 subscripts.  Put the upper bound for both subscripts on the
                       01BA     ; stack and make sure that the lower bound for both subscripts will start
                       01BA     ; at 1 (do not alter row or col 0)
                       01BA     ;-
                       01BA
                       01BA     INIT_TWO_SUBSW:
           20 AA   DD  01BA             PUSHL   dsc$l_u1_2(R10)                 ; 1st upper bound
           1C AA   DD  01BD             PUSHL   dsc$l_l1_2(R10)                 ; 1st lower bound
              03   14  01C0             BGTR    1$                              ; not row 0 or neg, do cols
        6E    01   D0  01C2             MOVL    #1, (SP)                        ; start with row 1
    59     28 AA   D0  01C5     1$:     MOVL    dsc$l_u2_2(R10), R9             ; 2nd upper bound
           24 AA   DD  01C9             PUSHL   dsc$l_l2_2(R10)                 ; 2nd lower bound
              03   14  01CC             BGTR    LOOP_1ST_SUBW           ; not col 0, go loop
        6E    01   D0  01CE             MOVL    #1, (SP)                        ; start with col 1
                       01D1
                       01D1     ;+
                       01D1     ; Loop through all the rows.  Row and column upper and lower bounds have been
                       01D1     ; initialized on the stack.
                       01D1     ;-
                       01D1
                       01D1     LOOP_1ST_SUBW:
        5B    6E   D0  01D1             MOVL    lower_bnd2(SP), R11             ; R11 has 2nd lower bound
                       01D4
                       01D4     ;+
                       01D4     ; Loop through all the elements (columns) of the current row.  Column lower
                       01D4     ; bound is initialized in R11.  Column upper bound is on the stack.
                       01D4     ; Distinguish array by data type so that the correct store routine can be
                       01D4     ; called and the constant can be converted to the correct type.
                       01D4     ;-
                       01D4
                       01D4     LOOP_2ND_SUBW:
                       01D4
    50     24 AE   B0  01D4             MOVW    constant_cvt(SP), R0    ; put constant into R0
                       01D8                                                     ;  R0 & R1 for double
                       01D8     ;+
                       01D8     ; When passed by value, hfloat takes 4 words, gfloat and double take 2 words,
                       01D8     ; and all other data types take 1 longword.
                       01D8     ;-
                       01D8
                       01D8
                       01D8             .IF     IDN     W, H            ; data type is hfloat
                       01D8             MOVL    R10, R4                         ; pointer to array desc
                       01D8             MOVL    lower_bnd1(SP), R5              ; current row
                       01D8             MOVL    R11, R6                         ; current column
                       01D8             .IFF
                       01D8             .IF     IDN     W, G            ; data type is gfloat
                       01D8             MOVL    R10, R2                         ; pointer to array desc
                       01D8             MOVL    lower_bnd1(SP), R3              ; current row
                       01D8             MOVL    R11, R4                         ; current column
                       01D8             .IFF
                       01D8             .IF     IDN     W, D            ; data type is double
                       01D8             MOVL    R10, R2                         ; pointer to array desc
                       01D8             MOVL    lower_bnd1(SP), R3              ; current row
                       01D8             MOVL    R11, R4                         ; current column
                       01D8             .IFF                                    ; all other data types
```

```
                  51   5A   D0  01D8              MOVL     R10, R1                            ; pointer to array desc
               52   04 AE   D0  01DB              MOVL     lower_bnd1(SP), R2                 ; current row
                  53   5B   D0  01DF              MOVL     R11, R3                            ; current column
                                01E2              .ENDC
                                01E2              .ENDC
                                01E2              .ENDC
               14 AE   50   B0  01E2              MOVW     R0, data(SP)            ; store value in value_desc
                                01E6              STORE    W                                  ; store in array
                                01E6              .IF      IDN     W, H
                                01E6              CMPB     dsc$b_dtype(R4), #dsc$k_dtype_dsc
                                01E6              BNEQ     30034$
                                01E6              MOVL     4(R4), R0
                                01E6              MOVB     dsc$b_dtype(R0), dtype(SP)
                                01E6              MOVB     dsc$b_class(R0), class(SP)
                                01E6              MOVAL    data(SP), pointer (SP)
                                01E6              MOVW     #10, str_len(SP)
                                01E6              CMPB     dsc$b_dimct(R4), #1
                                01E6              BNEQ     30036$
                                01E6              PUSHL    R5
                                01E6              PUSHL    R4
                                01E6              PUSHAL   value_desc+8(SP)
                                01E6              CALLS    #3,G^BAS$STORE_BFA
                                01E6              BRW      30033$
                                01E6     30036$:  PUSHL    R6
                                01E6              PUSHL    R5
                                01E6              PUSHL    R4
                                01E6              PUSHAL   value_desc+12(SP)
                                01E6              CALLS    #4,G^BAS$STORE_BFA
                                01E6              BRW      30033$
                                01E6     30034$:  CMPB     dsc$b_class(R4), #dsc$k_class_bfa
                                01E6              BNEQ     30025$
                                01E6              JSB      G^BAS$STO_FA_W_R8
                                01E6              BRW      30033$
                                01E6     30025$:  BBS      #5, 10(R4), 30026$
                                01E6              CMPB     dsc$b_dimct(R4), #1
                                01E6              BNEQ     30035$
                                01E6              MOVZWL   dsc$w_length(R4), R8
                                01E6              INDEX    R5, dsc$l_l1_1(R4), dsc$l_u1_1(R4), R8, #0, R7
                                01E6              ADDL     dsc$a_a0(R4), R7
                                01E6              MOVW     R0, (R7)
                                01E6              BRW      30033$
                                01E6     30035$:  INDEX    R5, dsc$l_l1_2(R4), dsc$l_u1_2(R4), dsc$l_m2(R4), #0, R7
                                01E6              MOVZWL   dsc$w_length(R4), R8
                                01E6              INDEX    R6, dsc$l_l2_2(R4), dsc$l_u2_2(R4), R8, R7, R7
                                01E6              ADDL     dsc$a_a0(R4), R7
                                01E6              MOVW     R0, (R7)
                                01E6              BRW      30033$
                                01E6     30026$:  CMPB     dsc$b_dimct(R4), #1
                                01E6              BNEQ     30037$
                                01E6              MOVZWL   dsc$w_length(R4), R8
                                01E6              INDEX    R6, dsc$l_l1_1(R4), dsc$l_u1_1(R4), R8, #0, R7
                                01E6              ADDL     dsc$a_a0(R4), R7
                                01E6              MOVW     R0, (R7)
                                01E6              BRW      30033$
                                01E6     30037$:  INDEX    R6, dsc$l_l2_2(R4), dsc$l_u2_2(R4), dsc$l_m1(R4), #0, R7
                                01E6              MOVZWL   dsc$w_length(R4), R8
                                01E6              INDEX    R5, dsc$l_l1_2(R4), dsc$l_u1_2(R4), R8, R7, R7
```

```
                             01E6                 ADDL    dsc$a_a0(R4), R7
                             01E6                 MOVW    R0, (R7)
                             01E6                 .IFF
                             01E6                 .IF     IDN     W, G
                             01E6                 CMPB    dsc$b_dtype(R2), #dsc$k_dtype_dsc
                             01E6                 BNEQ    30038$
                             01E6                 MOVL    4(R2), R0
                             01E6                 MOVB    dsc$b_dtype(R0), dtype(SP)
                             01E6                 MOVB    dsc$b_class(R0), class(SP)
                             01E6                 MOVAL   data(SP), pointer (SP)
                             01E6                 MOVW    #10, str_len(SP)
                             01E6                 CMPB    dsc$b_dimct(R2), #1
                             01E6                 BNEQ    30040$
                             01E6                 PUSHL   R3
                             01E6                 PUSHL   R2
                             01E6                 PUSHAL  value_desc+8(SP)
                             01E6                 CALLS   #3,G^BAS$STORE_BFA
                             01E6                 BRW     30033$
                             01E6         30040$: PUSHL   R4
                             01E6                 PUSHL   R3
                             01E6                 PUSHL   R2
                             01E6                 PUSHAL  value_desc+12(SP)
                             01E6                 CALLS   #4,G^BAS$STORE_BFA
                             01E6                 BRW     30033$
                             01E6         30038$: CMPB    dsc$b_class(R2), #dsc$k_class_bfa
                             01E6                 BNEQ    30027$
                             01E6                 JSB     G^BAS$STO_FA_W_R8
                             01E6                 BRW     30033$
                             01E6         30027$: BBS     #5, 10(R2), 30028$
                             01E6                 CMPB    dsc$b_dimct(R2), #1
                             01E6                 BNEQ    30039$
                             01E6                 MOVZWL  dsc$w_length(R2), R6
                             01E6                 INDEX   R3, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                             01E6                 ADDL    dsc$a_a0(R2), R5
                             01E6                 MOVW    R0, (R5)
                             01E6                 BRW     30033$
                             01E6         30039$: INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), dsc$l_m2(R2), #0, R5
                             01E6                 MOVZWL  dsc$w_length(R2), R6
                             01E6                 INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), R6, R5, R5
                             01E6                 ADDL    dsc$a_a0(R2), R5
                             01E6                 MOVW    R0, (R5)
                             01E6                 BRW     30033$
                             01E6         30028$: CMPB    dsc$b_dimct(R2), #1
                             01E6                 BNEQ    30041$
                             01E6                 MOVZWL  dsc$w_length(R2), R6
                             01E6                 INDEX   R4, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                             01E6                 ADDL    dsc$a_a0(R2), R5
                             01E6                 MOVW    R0, (R5)
                             01E6                 BRW     30033$
                             01E6         30041$: INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), dsc$l_m1(R2), #0, R5
                             01E6                 MOVZWL  dsc$w_length(R2), R6
                             01E6                 INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), R6, R5, R5
                             01E6                 ADDL    dsc$a_a0(R2), R5
                             01E6                 MOVW    R0, (R5)
                             01E6                 .IFF
                             01E6                 .IF     IDN     W, D
                             01E6                 CMPB    dsc$b_dtype(R2), #dsc$k_dtype_dsc
```

```
                          01E6              BNEQ     30042$
                          01E6              MOVL     4(R2), R0
                          01E6              MOVB     dsc$b_dtype(R0), dtype(SP)
                          01E6              MOVB     dsc$b_class(R0), class(SP)
                          01E6              MOVAL    data(SP), pointer (SP)
                          01E6              MOVW     #10, str_len(SP)
                          01E6              CMPB     dsc$b_dimct(R2), #1
                          01E6              BNEQ     30044$
                          01E6              PUSHL    R3
                          01E6              PUSHL    R2
                          01E6              PUSHAL   value_desc+8(SP)
                          01E6              CALLS    #3,G^BAS$STORE_BFA
                          01E6              BRW      30033$
                          01E6     30044$:  PUSHL    R4
                          01E6              PUSHL    R3
                          01E6              PUSHL    R2
                          01E6              PUSHAL   value_desc+12(SP)
                          01E6              CALLS    #4,G^BAS$STORE_BFA
                          01E6              BRW      30033$
                          01E6     30042$:  CMPB     dsc$b_class(R2), #dsc$k_class_bfa
                          01E6              BNEQ     30029$
                          01E6              JSB      G^BAS$STO_FA_W_R8
                          01E6              BRW      30033$
                          01E6     30029$:  BBS      #5, 10(R2), 30030$
                          01E6              CMPB     dsc$b_dimct(R2), #1
                          01E6              BNEQ     30043$
                          01E6              MOVZWL   dsc$w_length(R2), R6
                          01E6              INDEX    R3, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                          01E6              ADDL     dsc$a_a0(R2), R5
                          01E6              MOVW     R0, (R5)
                          01E6              BRW      30033$
                          01E6     30043$:  INDEX    R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), dsc$l_m2(R2), #0, R5
                          01E6              MOVZWL   dsc$w_length(R2), R6
                          01E6              INDEX    R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), R6, R5, R5
                          01E6              ADDL     dsc$a_a0(R2), R5
                          01E6              MOVW     R0, (R5)
                          01E6              BRW      30033$
                          01E6     30030$:  CMPB     dsc$b_dimct(R2), #1
                          01E6              BNEQ     30045$
                          01E6              MOVZWL   dsc$w_length(R2), R6
                          01E6              INDEX    R4, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                          01E6              ADDL     dsc$a_a0(R2), R5
                          01E6              MOVW     R0, (R5)
                          01E6              BRW      30033$
                          01E6     30045$:  INDEX    R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), dsc$l_m1(R2), #0, R5
                          01E6              MOVZWL   dsc$w_length(R2), R6
                          01E6              INDEX    R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), R6, R5, R5
                          01E6              ADDL     dsc$a_a0(R2), R5
                          01E6              MOVW     R0, (R5)
                          01E6              .IFF
    18    02 A1     91    01E6              CMPB     dsc$b_dtype(R1), #dsc$k_dtype_dsc
             41     12    01EA              BNEQ     30046$
    50    04 A1     D0    01EC              MOVL     4(R1), R0
 0E AE    02 A0     90    01F0              MOVB     dsc$b_dtype(R0), dtype(SP)
 0F AE    03 A0     90    01F5              MOVB     dsc$b_class(R0), class(SP)
 10 AE    14 AE     DE    01FA              MOVAL    data(SP), pointer (SP)
    0C AE    0A     B0    01FF              MOVW     #10, str_len(SP)
```

```
                       01    0B A1    91  0203            CMPB    dsc$b_dimct(R1), #1
                                11    12  0207            BNEQ    30048$
                                52    DD  0209            PUSHL   R2
                                51    DD  020B            PUSHL   R1
                             14 AE    DF  020D            PUSHAL  value_desc+8(SP)
                  00000000'GF   03    FB  0210            CALLS   #3,G^BAS$STORE_BFA
                              009D    31  0217            BRW     30033$
                                53    DD  021A   30048$:  PUSHL   R3
                                52    DD  021C            PUSHL   R2
                                51    DD  021E            PUSHL   R1
                             18 AE    DF  0220            PUSHAL  value_desc+12(SP)
                  00000000'GF   04    FB  0223            CALLS   #4,G^BAS$STORE_BFA
                              008A    31  022A            BRW     30033$
                    BF 8F    03 A1    91  022D   30046$:  CMPB    dsc$b_class(R1), #dsc$k_class_bfa
                                09    12  0232            BNEQ    30031$
                          00000000'GF 16  0234            JSB     G^BAS$STO_FA_W_R8
                              007A    31  023A            BRW     30033$
                    3C 0A A1    05    E0  023D   30031$:  BBS     #5, 10(R1), 30032$
                       01    0B A1    91  0242            CMPB    dsc$b_dimct(R1), #1
                                16    12  0246            BNEQ    30047$
                             55    61 3C  0248            MOVZWL  dsc$w_length(R1), R5
  00    55    1C A1    18 A1    52    0A  024B            INDEX   R2, dsc$l_l1_1(R1), dsc$l_u1_1(R1), R5, #0, R4
                                54        0253
                       54    10 A1    C0  0254            ADDL    dsc$a_a0(R1), R4
                             64    50 B0  0258            MOVW    R0, (R4)
                              0059    31  025B            BRW     30033$
    18 A1    20 A1    1C A1    52     0A  025E   30047$:  INDEX   R2, dsc$l_l1_2(R1), dsc$l_u1_2(R1), dsc$l_m2(R1), #0, R4
                             54    00     0266
                             55    61 3C  0268            MOVZWL  dsc$w_length(R1), R5
  54    55    28 A1    24 A1    53    0A  026B            INDEX   R3, dsc$l_l2_2(R1), dsc$l_u2_2(R1), R5, R4, R4
                                54        0273
                       54    10 A1    C0  0274            ADDL    dsc$a_a0(R1), R4
                             64    50 B0  0278            MOVW    R0, (R4)
                              0039    31  027B            BRW     30033$
                       01    0B A1    91  027E   30032$:  CMPB    dsc$b_dimct(R1), #1
                                16    12  0282            BNEQ    30049$
                             55    61 3C  0284            MOVZWL  dsc$w_length(R1), R5
  00    55    1C A1    18 A1    53    0A  0287            INDEX   R3, dsc$l_l1_1(R1), dsc$l_u1_1(R1), R5, #0, R4
                                54        028F
                       54    10 A1    C0  0290            ADDL    dsc$a_a0(R1), R4
                             64    50 B0  0294            MOVW    R0, (R4)
                              001D    31  0297            BRW     30033$
    14 A1    28 A1    24 A1    53     0A  029A   30049$:  INDEX   R3, dsc$l_l2_2(R1), dsc$l_u2_2(R1), dsc$l_m1(R1), #0, R4
                             54    00     02A2
                             55    61 3C  02A4            MOVZWL  dsc$w_length(R1), R5
  54    55    20 A1    1C A1    52    0A  02A7            INDEX   R2, dsc$l_l1_2(R1), dsc$l_u1_2(R1), R5, R4, R4
                                54        02AF
                       54    10 A1    C0  02B0            ADDL    dsc$a_a0(R1), R4
                             64    50 B0  02B4            MOVW    R0, (R4)
                                          02B7            .ENDC
                                          02B7            .ENDC
                                          02B7            .ENDC
                                          02B7   30033$:
                                          02B7
                                5B    D6  02B7            INCL    R11                                   ; get next column
                             59    5B D1  02B9            CMPL    R11, R9                               ; see if last column done
                                03    14  02BC            BGTR    2$
```

```
                 FF13   31  02BE            BRW     LOOP_2ND_SUBW           ; no, continue inner loop
                            02C1
                            02C1      ;+
                            02C1      ; Have completed entire row.  See if it was the last row.  If not,
                            02C1      ; continue with next row.
                            02C1      ;-
                            02C1
                04 AE   D6  02C1      2$:   INCL    lower_bnd1(SP)                       ; get next row
         08 AE  04 AE   D1  02C4            CMPL    lower_bnd1(SP), upper_bnd1(SP)       ; see if last row done
                   03   14  02C9            BGTR    3$
                 FF03   31  02CB            BRW     LOOP_1ST_SUBW           ; no, continue outer loop
                            02CE
                        04  02CE      3$:   RET                                          ; yes, finished
                            02CF
```

```
                         02CF   375 LONG:   $BAS$MAT_INIT L                         ; expand to long operations
                         02CF
                         02CF       ;+
                         02CF       ;       REGISTER USAGE
                         02CF       ;       R0 - R8 destroyed by store routines
                         02CF       ;       R9      upper bound for 2nd subscript
                         02CF       ;       R10     pointer to array descriptor
                         02CF       ;       R11     current value of 2nd subscript
                         02CF       ;-
                         02CF
                         02CF       ;+
                         02CF       ; Set up limits for looping through all elements
                         02CF       ;-
                         02CF
                         02CF               .IF     IDN     L, L
                         02CF               .IFT                                     ; data type is long
   7E   08 AC    D0      02CF               MOVL    constant(AP), -(SP)              ; move constant
                         02D3               .IFF                                     ; data type is not long
                         02D3               CVTLL   constant(AP), -(SP)     ; make constant same datatype
                         02D3                                                        ;  as array, save on stack
                         02D3               .ENDC
                         02D3               .IF     IDN     L, D            ; if array is double
                         02D3               MOVL    SF$L_SAVE_FP(FP), R0             ; pass FP to get scale
                         02D3               JSB     G^BAS$$SCALE_R1                  ; get scale in R0 & R1
                         02D3                                                        ; call a BLISS routine because
                         02D3                                                        ; the frame offsets are only
                         02D3                                                        ; defined for BLISS
                         02D3               MULD2   R0, (SP)                         ; scale
                         02D3               .ENDC
                         02D3
                         02D3       ;+
                         02D3       ; Allocate data and value_desc on the stack.  This applies to both
                         02D3       ; one and two dimensions.
                         02D3       ;-
                         02D3
            7E   7C      02D3               CLRQ    -(SP)                            ; space for data
            7E   7C      02D5               CLRQ    -(SP)                            ;  may be hfloat
            7E   7C      02D7               CLRQ    -(SP)                            ; space for value_desc
                         02D9
   01   0B AA    91      02D9               CMPB    DSC$B_DIMCT(R10), #1             ; determine # of subscripts
            05   13      02DD               BEQLU   INIT_ONE_SUBL           ; 1 sub, go init
            15   1A      02DF               BGTRU   INIT_TWO_SUBSL          ; >=2 subs, go init
          FD66   31      02E1               BRW     ERR_ARGDONMAT                    ; 0 subs, error
                         02E4
                         02E4       ;+
                         02E4       ; There is only 1 subscript.  Make both upper and lower bound for 2nd
                         02E4       ; subscript a 1.  The second subscript will be passed to and ignored by the
                         02E4       ; store routine.
                         02E4       ;-
                         02E4
                         02E4       INIT_ONE_SUBL:
         1C AA   DD      02E4               PUSHL   dsc$l_u1_1(R10)                  ; 1st upper bound
         18 AA   DD      02E7               PUSHL   dsc$l_l1_1(R10)                  ; 1st lower bound
            03   14      02EA               BGTR    1$                               ; not 0 or neg, do 2nd sub
      6E    01   D0      02EC               MOVL    #1, (SP)                         ; don't alter col 0
      59    01   D0      02EF       1$:     MOVL    #1, R9                           ; dummy 2nd lower bound
            01   DD      02F2               PUSHL   #1                               ; dummy 2nd upper bound
```

```
                 1A   11  02F4              BRB     LOOP_2ND_SUBL           ; go loop
                          02F6
                          02F6      ;+
                          02F6      ; There are 2 subscripts.  Put the upper bound for both subscripts on the
                          02F6      ; stack and make sure that the lower bound for both subscripts will start
                          02F6      ; at 1 (do not alter row or col 0)
                          02F6      ;-
                          02F6
                          02F6      INIT_TWO_SUBSL:
            20 AA   DD    02F6              PUSHL   dsc$l_u1_2(R10)                 ; 1st upper bound
            1C AA   DD    02F9              PUSHL   dsc$l_l1_2(R10)                 ; 1st lower bound
               03   14    02FC              BGTR    1$                              ; not row 0 or neg, do cols
         6E    01   D0    02FE              MOVL    #1, (SP)                        ; start with row 1
      59    28 AA   D0    0301      1$:     MOVL    dsc$l_u2_2(R10), R9             ; 2nd upper bound
            24 AA   DD    0305              PUSHL   dsc$l_l2_2(R10)                 ; 2nd lower bound
               03   14    0308              BGTR    LOOP_1ST_SUBL           ; not col 0, go loop
         6E    01   D0    030A              MOVL    #1, (SP)                        ; start with col 1
                          030D
                          030D      ;+
                          030D      ; Loop through all the rows.  Row and column upper and lower bounds have been
                          030D      ; initialized on the stack.
                          030D      ;-
                          030D
                          030D      LOOP_1ST_SUBL:
         5B    6E   D0    030D              MOVL    lower_bnd2(SP), R11             ; R11 has 2nd lower bound
                          0310
                          0310      ;+
                          0310      ; Loop through all the elements (columns) of the current row.  Column lower
                          0310      ; bound is initialized in R11.  Column upper bound is on the stack.
                          0310      ; Distinguish array by data type so that the correct store routine can be
                          0310      ; called and the constant can be converted to the correct type.
                          0310      ;-
                          0310
                          0310      LOOP_2ND_SUBL:
                          0310
      50    24 AE   D0    0310              MOVL    constant_cvt(SP), R0    ; put constant into R0
                          0314                                                      ;  R0 & R1 for double
                          0314      ;+
                          0314      ; When passed by value, hfloat takes 4 words, gfloat and double take 2 words,
                          0314      ; and all other data types take 1 longword.
                          0314      ;-
                          0314
                          0314              .IF     IDN     L, H            ; data type is hfloat
                          0314              MOVL    R10, R4                         ; pointer to array desc
                          0314              MOVL    lower_bnd1(SP), R5              ; current row
                          0314              MOVL    R11, R6                         ; current column
                          0314              .IFF
                          0314              .IF     IDN     L, G            ; data type is gfloat
                          0314              MOVL    R10, R2                         ; pointer to array desc
                          0314              MOVL    lower_bnd1(SP), R3              ; current row
                          0314              MOVL    R11, R4                         ; current column
                          0314              .IFF
                          0314              .IF     IDN     L, D            ; data type is double
                          0314              MOVL    R10, R2                         ; pointer to array desc
                          0314              MOVL    lower_bnd1(SP), R3              ; current row
                          0314              MOVL    R11, R4                         ; current column
                          0314              .IFF                                    ; all other data types
```

```
             51    5A   D0  0314              MOVL    R10, R1                         ; pointer to array desc
          52    04 AE   D0  0317              MOVL    lower_bnd1(SP), R2              ; current row
             53    5B   D0  031B              MOVL    R11, R3                         ; current column
                            031E              .ENDC
                            031E              .ENDC
                            031E              .ENDC
          14 AE    50   D0  031E              MOVL    R0, data(SP)               ; store value in value_desc
                            0322              STORE   L                               ; store in array
                            0322              .IF     IDN     L, M                    ;
                            0322              CMPB    dsc$b_dtype(R4), #dsc$k_dtype_dsc
                            0322              BNEQ    30059$
                            0322              MOVL    4(R4), R0
                            0322              MOVB    dsc$b_dtype(R0), dtype(SP)
                            0322              MOVB    dsc$b_class(R0), class(SP)
                            0322              MOVAL   data(SP), pointer (SP)
                            0322              MOVW    #10, str_len(SP)
                            0322              CMPB    dsc$b_dimct(R4), #1
                            0322              BNEQ    30061$
                            0322              PUSHL   R5
                            0322              PUSHL   R4
                            0322              PUSHAL  value_desc+8(SP)
                            0322              CALLS   #3,G^BAS$STORE_BFA
                            0322              BRW     30058$
                            0322     30061$:  PUSHL   R6
                            0322              PUSHL   R5
                            0322              PUSHL   R4
                            0322              PUSHAL  value_desc+12(SP)
                            0322              CALLS   #4,G^BAS$STORE_BFA
                            0322              BRW     30058$
                            0322     30059$:  CMPB    dsc$b_class(R4), #dsc$k_class_bfa
                            0322              BNEQ    30050$
                            0322              JSB     G^BAS$STO_FA_L_R8
                            0322              BRW     30058$
                            0322     30050$:  BBS     #5, 10(R4), 30051$
                            0322              CMPB    dsc$b_dimct(R4), #1
                            0322              BNEQ    30060$
                            0322              MOVZWL  dsc$w_length(R4), R8
                            0322              INDEX   R5, dsc$l_l1_1(R4), dsc$l_u1_1(R4), R8, #0, R7
                            0322              ADDL    dsc$a_a0(R4), R7
                            0322              MOVL    R0, (R7)
                            0322              BRW     30058$
                            0322     30060$:  INDEX   R5, dsc$l_l1_2(R4), dsc$l_u1_2(R4), dsc$l_m2(R4), #0, R7
                            0322              MOVZWL  dsc$w_length(R4), R8
                            0322              INDEX   R6, dsc$l_l2_2(R4), dsc$l_u2_2(R4), R8, R7, R7
                            0322              ADDL    dsc$a_a0(R4), R7
                            0322              MOVL    R0, (R7)
                            0322              BRW     30058$
                            0322     30051$:  CMPB    dsc$b_dimct(R4), #1
                            0322              BNEQ    30062$
                            0322              MOVZWL  dsc$w_length(R4), R8
                            0322              INDEX   R6, dsc$l_l1_1(R4), dsc$l_u1_1(R4), R8, #0, R7
                            0322              ADDL    dsc$a_a0(R4), R7
                            0322              MOVL    R0, (R7)
                            0322              BRW     30058$
                            0322     30062$:  INDEX   R6, dsc$l_l2_2(R4), dsc$l_u2_2(R4), dsc$l_m1(R4), #0, R7
                            0322              MOVZWL  dsc$w_length(R4), R8
                            0322              INDEX   R5, dsc$l_l1_2(R4), dsc$l_u1_2(R4), R8, R7, R7
```

```
0322                ADDL     dsc$a_a0(R4), R7
0322                MOVL     R0, (R7)
0322                .IFF
0322                .IF      IDN     L, G
0322                CMPB     dsc$b_dtype(R2), #dsc$k_dtype_dsc
0322                BNEQ     30063$
0322                MOVL     4(R2), R0
0322                MOVB     dsc$b_dtype(R0), dtype(SP)
0322                MOVB     dsc$b_class(R0), class(SP)
0322                MOVAL    data(SP), pointer (SP)
0322                MOVW     #10, str_len(SP)
0322                CMPB     dsc$b_dimct(R2), #1
0322                BNEQ     30065$
0322                PUSHL    R3
0322                PUSHL    R2
0322                PUSHAL   value_desc+8(SP)
0322                CALLS    #3,G^BAS$STORE_BFA
0322                BRW      30058$
0322       30065$:  PUSHL    R4
0322                PUSHL    R3
0322                PUSHL    R2
0322                PUSHAL   value_desc+12(SP)
0322                CALLS    #4,G^BAS$STORE_BFA
0322                BRW      30058$
0322       30063$:  CMPB     dsc$b_class(R2), #dsc$k_class_bfa
0322                BNEQ     30052$
0322                JSB      G^BAS$STO_FA_L_R8
0322                BRW      30058$
0322       30052$:  BBS      #5, 10(R2), 30053$
0322                CMPB     dsc$b_dimct(R2), #1
0322                BNEQ     30064$
0322                MOVZWL   dsc$w_length(R2), R6
0322                INDEX    R3, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
0322                ADDL     dsc$a_a0(R2), R5
0322                MOVL     R0, (R5)
0322                BRW      30058$
0322       30064$:  INDEX    R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), dsc$l_m2(R2), #0, R5
0322                MOVZWL   dsc$w_length(R2), R6
0322                INDEX    R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), R6, R5, R5
0322                ADDL     dsc$a_a0(R2), R5
0322                MOVL     R0, (R5)
0322                BRW      30058$
0322       30053$:  CMPB     dsc$b_dimct(R2), #1
0322                BNEQ     30066$
0322                MOVZWL   dsc$w_length(R2), R6
0322                INDEX    R4, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
0322                ADDL     dsc$a_a0(R2), R5
0322                MOVL     R0, (R5)
0322                BRW      30058$
0322       30066$:  INDEX    R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), dsc$l_m1(R2), #0, R5
0322                MOVZWL   dsc$w_length(R2), R6
0322                INDEX    R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), R6, R5, R5
0322                ADDL     dsc$a_a0(R2), R5
0322                MOVL     R0, (R5)
0322                .IFF
0322                .IF      IDN     L, D
0322                CMPB     dsc$b_dtype(R2), #dsc$k_dtype_dsc
```

```
                           0322                  BNEQ     30067$
                           0322                  MOVL     4(R2), R0
                           0322                  MOVB     dsc$b_dtype(R0), dtype(SP)
                           0322                  MOVB     dsc$b_class(R0), class(SP)
                           0322                  MOVAL    data(SP), pointer (SP)
                           0322                  MOVW     #10, str_len(SP)
                           0322                  CMPB     dsc$b_dimct(R2), #1
                           0322                  BNEQ     30069$
                           0322                  PUSHL    R3
                           0322                  PUSHL    R2
                           0322                  PUSHAL   value_desc+8(SP)
                           0322                  CALLS    #3,G^BAS$STORE_BFA
                           0322                  BRW      30058$
                           0322          30069$: PUSHL    R4
                           0322                  PUSHL    R3
                           0322                  PUSHL    R2
                           0322                  PUSHAL   value_desc+12(SP)
                           0322                  CALLS    #4,G^BAS$STORE_BFA
                           0322                  BRW      30058$
                           0322          30067$: CMPB     dsc$b_class(R2), #dsc$k_class_bfa
                           0322                  BNEQ     30054$
                           0322                  JSB      G^BAS$STO_FA_L_R8
                           0322                  BRW      30058$
                           0322          30054$: BBS      #5, 10(R2), 30055$
                           0322                  CMPB     dsc$b_dimct(R2), #1
                           0322                  BNEQ     30068$
                           0322                  MOVZWL   dsc$w_length(R2), R6
                           0322                  INDEX    R3, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                           0322                  ADDL     dsc$a_a0(R2), R5
                           0322                  MOVL     R0, (R5)
                           0322                  BRW      30058$
                           0322          30068$: INDEX    R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), dsc$l_m2(R2), #0, R5
                           0322                  MOVZWL   dsc$w_length(R2), R6
                           0322                  INDEX    R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), R6, R5, R5
                           0322                  ADDL     dsc$a_a0(R2), R5
                           0322                  MOVL     R0, (R5)
                           0322                  BRW      30058$
                           0322          30055$: CMPB     dsc$b_dimct(R2), #1
                           0322                  BNEQ     30070$
                           0322                  MOVZWL   dsc$w_length(R2), R6
                           0322                  INDEX    R4, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                           0322                  ADDL     dsc$a_a0(R2), R5
                           0322                  MOVL     R0, (R5)
                           0322                  BRW      30058$
                           0322          30070$: INDEX    R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), dsc$l_m1(R2), #0, R5
                           0322                  MOVZWL   dsc$w_length(R2), R6
                           0322                  INDEX    R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), R6, R5, R5
                           0322                  ADDL     dsc$a_a0(R2), R5
                           0322                  MOVL     R0, (R5)
                           0322                  .IFF
       18    02 A1    91   0322                  CMPB     dsc$b_dtype(R1), #dsc$k_dtype_dsc
                41    12   0326                  BNEQ     30071$
       50    04 A1    D0   0328                  MOVL     4(R1), R0
    0E AE    02 A0    90   032C                  MOVB     dsc$b_dtype(R0), dtype(SP)
    0F AE    03 A0    90   0331                  MOVB     dsc$b_class(R0), class(SP)
    10 AE    14 AE    DE   0336                  MOVAL    data(SP), pointer (SP)
       0C AE    0A    B0   033B                  MOVW     #10, str_len(SP)
```

```
                   01   0B A1   91  033F            CMPB    dsc$b_dimct(R1), #1
                            11  12  0343            BNEQ    30073$
                            52  DD  0345            PUSHL   R2
                            51  DD  0347            PUSHL   R1
                         14 AE  DF  0349            PUSHAL  value_desc+8(SP)
           00000000'GF      03  FB  034C            CALLS   #3,G^BAS$STORE_BFA
                          009D  31  0353            BRW     30058$
                            53  DD  0356   30073$:  PUSHL   R3
                            52  DD  0358            PUSHL   R2
                            51  DD  035A            PUSHL   R1
                         18 AE  DF  035C            PUSHAL  value_desc+12(SP)
           00000000'GF      04  FB  035F            CALLS   #4,G^BAS$STORE_BFA
                          008A  31  0366            BRW     30058$
              BF 8F      03 A1  91  0369   30071$:  CMPB    dsc$b_class(R1), #dsc$k_class_bfa
                            09  12  036E            BNEQ    30056$
                   00000000'GF  16  0370            JSB     G^BAS$STO_FA_L_R8
                          007A  31  0376            BRW     30058$
              3C 0A A1      05  E0  0379   30056$:  BBS     #5, 10(R1), 30057$
                   01   0B A1   91  037E            CMPB    dsc$b_dimct(R1), #1
                            16  12  0382            BNEQ    30072$
                        55  61  3C  0384            MOVZWL  dsc$w_length(R1), R5
 00    55    1C A1   18 A1  52  0A  0387            INDEX   R2, dsc$l_l1_1(R1), dsc$l_u1_1(R1), R5, #0, R4
                            54      038F
                   54   10 A1   C0  0390            ADDL    dsc$a_a0(R1), R4
                        64  50  D0  0394            MOVL    R0, (R4)
                          0059  31  0397            BRW     30058$
   18 A1     20 A1   1C A1  52  0A  039A   30072$:  INDEX   R2, dsc$l_l1_2(R1), dsc$l_u1_2(R1), dsc$l_m2(R1), #0, R4
                        54  00      03A2
                        55  61  3C  03A4            MOVZWL  dsc$w_length(R1), R5
 54    55    28 A1   24 A1  53  0A  03A7            INDEX   R3, dsc$l_l2_2(R1), dsc$l_u2_2(R1), R5, R4, R4
                            54      03AF
                   54   10 A1   C0  03B0            ADDL    dsc$a_a0(R1), R4
                        64  50  D0  03B4            MOVL    R0, (R4)
                          0039  31  03B7            BRW     30058$
                   01   0B A1   91  03BA   30057$:  CMPB    dsc$b_dimct(R1), #1
                            16  12  03BE            BNEQ    30074$
                        55  61  3C  03C0            MOVZWL  dsc$w_length(R1), R5
 00    55    1C A1   18 A1  53  0A  03C3            INDEX   R3, dsc$l_l1_1(R1), dsc$l_u1_1(R1), R5, #0, R4
                            54      03CB
                   54   10 A1   C0  03CC            ADDL    dsc$a_a0(R1), R4
                        64  50  D0  03D0            MOVL    R0, (R4)
                          001D  31  03D3            BRW     30058$
   14 A1     28 A1   24 A1  53  0A  03D6   30074$:  INDEX   R3, dsc$l_l2_2(R1), dsc$l_u2_2(R1), dsc$l_m1(R1), #0, R4
                        54  00      03DE
                        55  61  3C  03E0            MOVZWL  dsc$w_length(R1), R5
 54    55    20 A1   1C A1  52  0A  03E3            INDEX   R2, dsc$l_l1_2(R1), dsc$l_u1_2(R1), R5, R4, R4
                            54      03EB
                   54   10 A1   C0  03EC            ADDL    dsc$a_a0(R1), R4
                        64  50  D0  03F0            MOVL    R0, (R4)
                                    03F3            .ENDC
                                    03F3            .ENDC
                                    03F3            .ENDC
                                    03F3   30058$:
                                    03F3
                            5B  D6  03F3            INCL    R11                                          ; get next column
                        59  5B  D1  03F5            CMPL    R11, R9                                      ; see if last column done
                            03  14  03F8            BGTR    2$
```

```
                    FF13   31  03FA             BRW     LOOP_2ND_SUBL           ; no, continue inner loop
                               03FD
                               03FD      ;+
                               03FD      ; Have completed entire row.  See if it was the last row.  If not,
                               03FD      ; continue with next row.
                               03FD      ;-
                               03FD
                   04 AE   D6  03FD      2$:    INCL    lower_bnd1(SP)                      ; get next row
            08 AE  04 AE   D1  0400             CMPL    lower_bnd1(SP), upper_bnd1(SP)     ; see if last row done
                      03   14  0405             BGTR    3$
                    FF03   31  0407             BRW     LOOP_1ST_SUBL           ; no, continue outer loop
                               040A
                           04  040A      3$:    RET                                         ; yes, finished
                               040B
```

```
                         040B  FLOAT:  $BAS$MAT_INIT F                               ; expand to float operations
                         040B
                         040B          ;+
                         040B          ;       REGISTER USAGE
                         040B          ;       R0 - R8 destroyed by store routines
                         040B          ;       R9      upper bound for 2nd subscript
                         040B          ;       R10     pointer to array descriptor
                         040B          ;       R11     current value of 2nd subscript
                         040B          ;-
                         040B
                         040B          ;+
                         040B          ; Set up limits for looping through all elements
                         040B          ;-
                         040B
                         040B                  .IF     IDN     F, L
                         040B                  .IFT                                        ; data type is long
                         040B                  MOVL    constant(AP), -(SP)                 ; move constant
                         040B                  .IFF                                        ; data type is not long
   7E    08 AC    4E     040B                  CVTLF   constant(AP), -(SP)     ; make constant same datatype
                         040F                                                              ;  as array, save on stack
                         040F                  .ENDC
                         040F                  .IF     IDN     F, D            ; if array is double
                         040F                  MOVL    SF$L_SAVE_FP(FP), R0                ; pass FP to get scale
                         040F                  JSB     G^BAS$$SCALE_R1                     ; get scale in R0 & R1
                         040F                                                              ; call a BLISS routine because
                         040F                                                              ; the frame offsets are only
                         040F                                                              ; defined for BLISS
                         040F                  MULD2   R0, (SP)                            ; scale
                         040F                  .ENDC
                         040F
                         040F          ;+
                         040F          ; Allocate data and value_desc on the stack.  This applies to both
                         040F          ; one and two dimensions.
                         040F          ;-
                         040F
            7E    7C     040F                  CLRQ    -(SP)                               ; space for data
            7E    7C     0411                  CLRQ    -(SP)                               ;  may be hfloat
            7E    7C     0413                  CLRQ    -(SP)                               ; space for value_desc
                         0415
   01    0B AA    91     0415                  CMPB    DSC$B_DIMCT(R10), #1                ; determine # of subscripts
            05    13     0419                  BEQLU   INIT_ONE_SUBF           ; 1 sub, go init
            15    1A     041B                  BGTRU   INIT_TWO_SUBSF          ; >=2 subs, go init
          FC2A    31     041D                  BRW     ERR_ARGDONMAT                       ; 0 subs, error
                         0420
                         0420          ;+
                         0420          ; There is only 1 subscript.  Make both upper and lower bound for 2nd
                         0420          ; subscript a 1.  The second subscript will be passed to and ignored by the
                         0420          ; store routine.
                         0420          ;-
                         0420
                         0420          INIT_ONE_SUBF:
         1C AA    DD     0420                  PUSHL   dsc$l_u1_1(R10)                     ; 1st upper bound
         18 AA    DD     0423                  PUSHL   dsc$l_l1_1(R10)                     ; 1st lower bound
            03    14     0426                  BGTR    1$                                  ; not 0 or neg, do 2nd sub
      6E    01    D0     0428                  MOVL    #1, (SP)                            ; don't alter col 0
      59    01    D0     042B          1$:     MOVL    #1, R9                              ; dummy 2nd lower bound
            01    DD     042E                  PUSHL   #1                                  ; dummy 2nd upper bound
```

```
             1A    11  0430            BRB      LOOP_2ND_SUBF           ; go loop
                       0432
                       0432     ;+
                       0432     ; There are 2 subscripts.  Put the upper bound for both subscripts on the
                       0432     ; stack and make sure that the lower bound for both subscripts will start
                       0432     ; at 1 (do not alter row or col 0)
                       0432     ;-
                       0432
                       0432     INIT_TWO_SUBSF:
          20 AA    DD  0432            PUSHL    dsc$l_u1_2(R10)                      ; 1st upper bound
          1C AA    DD  0435            PUSHL    dsc$l_l1_2(R10)                      ; 1st lower bound
             03    14  0438            BGTR     1$                                   ; not row 0 or neg, do cols
        6E   01    D0  043A            MOVL     #1, (SP)                             ; start with row 1
     59   28 AA    D0  043D     1$:    MOVL     dsc$l_u2_2(R10), R9                  ; 2nd upper bound
          24 AA    DD  0441            PUSHL    dsc$l_l2_2(R10)                      ; 2nd lower bound
             03    14  0444            BGTR     LOOP_1ST_SUBF           ; not col 0, go loop
        6E   01    D0  0446            MOVL     #1, (SP)                             ; start with col 1
                       0449
                       0449     ;+
                       0449     ; Loop through all the rows.  Row and column upper and lower bounds have been
                       0449     ; initialized on the stack.
                       0449     ;-
                       0449
                       0449     LOOP_1ST_SUBF:
        5B   6E    D0  0449            MOVL     lower_bnd2(SP), R11                  ; R11 has 2nd lower bound
                       044C
                       044C     ;+
                       044C     ; Loop through all the elements (columns) of the current row.  Column lower
                       044C     ; bound is initialized in R11.  Column upper bound is on the stack.
                       044C     ; Distinguish array by data type so that the correct store routine can be
                       044C     ; called and the constant can be converted to the correct type.
                       044C     ;-
                       044C
                       044C     LOOP_2ND_SUBF:
                       044C
     50   24 AE    50  044C            MOVF     constant_cvt(SP), R0    ; put constant into R0
                       0450                                                          ;  R0 & R1 for double
                       0450     ;+
                       0450     ; When passed by value, hfloat takes 4 words, gfloat and double take 2 words,
                       0450     ; and all other data types take 1 longword.
                       0450     ;-
                       0450
                       0450            .IF      IDN     F, H            ; data type is hfloat
                       0450            MOVL     R10, R4                              ; pointer to array desc
                       0450            MOVL     lower_bnd1(SP), R5                   ; current row
                       0450            MOVL     R11, R6                              ; current column
                       0450            .IFF
                       0450            .IF      IDN     F, G            ; data type is gfloat
                       0450            MOVL     R10, R2                              ; pointer to array desc
                       0450            MOVL     lower_bnd1(SP), R3                   ; current row
                       0450            MOVL     R11, R4                              ; current column
                       0450            .IFF
                       0450            .IF      IDN     F, D            ; data type is double
                       0450            MOVL     R10, R2                              ; pointer to array desc
                       0450            MOVL     lower_bnd1(SP), R3                   ; current row
                       0450            MOVL     R11, R4                              ; current column
                       0450            .IFF                                          ; all other data types
```

```
              51    5A   D0  0450               MOVL    R10, R1                         ; pointer to array desc
           52    04 AE   D0  0453               MOVL    lower_bnd1(SP), R2              ; current row
              53    5B   D0  0457               MOVL    R11, R3                         ; current column
                             045A               .ENDC
                             045A               .ENDC
                             045A               .ENDC
        14 AE    50    50    045A               MOVF    R0, data(SP)            ; store value in value_desc
                             045E               STORE   F                               ; store in array
                             045E               .IF     IDN     F, H
                             045E               CMPB    dsc$b_dtype(R4), #dsc$k_dtype_dsc
                             045E               BNEQ    30084$
                             045E               MOVL    4(R4), R0
                             045E               MOVB    dsc$b_dtype(R0), dtype(SP)
                             045E               MOVB    dsc$b_class(R0), class(SP)
                             045E               MOVAL   data(SP), pointer (SP)
                             045E               MOVW    #10, str_len(SP)
                             045E               CMPB    dsc$b_dimct(R4), #1
                             045E               BNEQ    30086$
                             045E               PUSHL   R5
                             045E               PUSHL   R4
                             045E               PUSHAL  value_desc+8(SP)
                             045E               CALLS   #3,G^BAS$STORE_BFA
                             045E               BRW     30083$
                             045E      30086$:  PUSHL   R6
                             045E               PUSHL   R5
                             045E               PUSHL   R4
                             045E               PUSHAL  value_desc+12(SP)
                             045E               CALLS   #4,G^BAS$STORE_BFA
                             045E               BRW     30083$
                             045E      30084$:  CMPB    dsc$b_class(R4), #dsc$k_class_bfa
                             045E               BNEQ    30075$
                             045E               JSB     G^BAS$STO_FA_F_R8
                             045E               BRW     30083$
                             045E      30075$:  BBS     #5, 10(R4), 30076$
                             045E               CMPB    dsc$b_dimct(R4), #1
                             045E               BNEQ    30085$
                             045E               MOVZWL  dsc$w_length(R4), R8
                             045E               INDEX   R5, dsc$l_l1_1(R4), dsc$l_u1_1(R4), R8, #0, R7
                             045E               ADDL    dsc$a_a0(R4), R7
                             045E               MOVF    R0, (R7)
                             045E               BRW     30083$
                             045E      30085$:  INDEX   R5, dsc$l_l1_2(R4), dsc$l_u1_2(R4), dsr$l_m2(R4), #0, R7
                             045E               MOVZWL  dsc$w_length(R4), R8
                             045E               INDEX   R6, dsc$l_l2_2(R4), dsc$l_u2_2(R4), R8, R7, R7
                             045E               ADDL    dsc$a_a0(R4), R7
                             045E               MOVF    R0, (R7)
                             045E               BRW     30083$
                             045E      30076$:  CMPB    dsc$b_dimct(R4), #1
                             045E               BNEQ    30087$
                             045E               MOVZWL  dsc$w_length(R4), R8
                             045E               INDEX   R6, dsc$l_l1_1(R4), dsc$l_u1_1(R4), R8, #0, R7
                             045E               ADDL    dsc$a_a0(R4), R7
                             045E               MOVF    R0, (R7)
                             045E               BRW     30083$
                             045E      30087$:  INDEX   R6, dsc$l_l2_2(R4), dsc$l_u2_2(R4), dsc$l_m1(R4), #0, R7
                             045E               MOVZWL  dsc$w_length(R4), R8
                             045E               INDEX   R5, dsc$l_l1_2(R4), dsc$l_u1_2(R4), R8, R7, R7
        045E                    ADDL    dsc$a_a0(R4), R7
        045E                    MOVF    R0, (R7)
        045E                    .IFF
        045E                    .IF     IDN     F, G
        045E                    CMPB    dsc$b_dtype(R2), #dsc$k_dtype_dsc
        045E                    BNEQ    30088$
        045E                    MOVL    4(R2), R0
        045E                    MOVB    dsc$b_dtype(R0), dtype(SP)
        045E                    MOVB    dsc$b_class(R0), class(SP)
        045E                    MOVAL   data(SP), pointer (SP)
        045E                    MOVW    #10, str_len(SP)
        045E                    CMPB    dsc$b_dimct(R2), #1
        045E                    BNEQ    30090$
        045E                    PUSHL   R3
        045E                    PUSHL   R2
        045E                    PUSHAL  value_desc+8(SP)
        045E                    CALLS   #3,G^BAS$STORE_BFA
        045E                    BRW     30083$
        045E          30090$:   PUSHL   R4
        045E                    PUSHL   R3
        045E                    PUSHL   R2
        045E                    PUSHAL  value_desc+12(SP)
        045E                    CALLS   #4,G^BAS$STORE_BFA
        045E                    BRW     30083$
        045E          30088$:   CMPB    dsc$b_class(R2), #dsc$k_class_bfa
        045E                    BNEQ    30077$
        045E                    JSB     G^BAS$STO_FA_F_R8
        045E                    BRW     30083$
        045E          30077$:   BBS     #5, 10(R2), 30078$
        045E                    CMPB    dsc$b_dimct(R2), #1
        045E                    BNEQ    30089$
        045E                    MOVZWL  dsc$w_length(R2), R6
        045E                    INDEX   R3, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
        045E                    ADDL    dsc$a_a0(R2), R5
        045E                    MOVF    R0, (R5)
        045E                    BRW     30083$
        045E          30089$:   INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), dsc$l_m2(R2), #0, R5
        045E                    MOVZWL  dsc$w_length(R2), R6
        045E                    INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), R6, R5, R5
        045E                    ADDL    dsc$a_a0(R2), R5
        045E                    MOVF    R0, (R5)
        045E                    BRW     30083$
        045E          30078$:   CMPB    dsc$b_dimct(R2), #1
        045E                    BNEQ    30091$
        045E                    MOVZWL  dsc$w_length(R2), R6
        045E                    INDEX   R4, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
        045E                    ADDL    dsc$a_a0(R2), R5
        045E                    MOVF    R0, (R5)
        045E                    BRW     30083$
        045E          30091$:   INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), dsc$l_m1(R2), #0, R5
        045E                    MOVZWL  dsc$w_length(R2), R6
        045E                    INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), R6, R5, R5
        045E                    ADDL    dsc$a_a0(R2), R5
        045E                    MOVF    R0, (R5)
        045E                    .IFF
        045E                    .IF     IDN     F, D
        045E                    CMPB    dsc$b_dtype(R2), #dsc$k_dtype_dsc
```

```
                         045E                BNEQ    30092$
                         045E                MOVL    4(R2), R0
                         045E                MOVB    dsc$b_dtype(R0), dtype(SP)
                         045E                MOVB    dsc$b_class(R0), class(SP)
                         045E                MOVAL   data(SP), pointer (SP)
                         045E                MOVW    #10, str_len(SP)
                         045E                CMPB    dsc$b_dimct(R2), #1
                         045E                BNEQ    30094$
                         045E                PUSHL   R3
                         045E                PUSHL   R2
                         045E                PUSHAL  value_desc+8(SP)
                         045E                CALLS   #3,G^BAS$STORE_BFA
                         045E                BRW     30083$
                         045E      30094$:   PUSHL   R4
                         045E                PUSHL   R3
                         045E                PUSHL   R2
                         045E                PUSHAL  value_desc+12(SP)
                         045E                CALLS   #4,G^BAS$STORE_BFA
                         045E                BRW     30083$
                         045E      30092$:   CMPB    dsc$b_class(R2), #dsc$k_class_bfa
                         045E                BNEQ    30079$
                         045E                JSB     G^BAS$STO_FA_F_R8
                         045E                BRW     30083$
                         045E      30079$:   BBS     #5, 10(R2), 30080$
                         045E                CMPB    dsc$b_dimct(R2), #1
                         045E                BNEQ    30093$
                         045E                MOVZWL  dsc$w_length(R2), R6
                         045E                INDEX   R3, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                         045E                ADDL    dsc$a_a0(R2), R5
                         045E                MOVF    R0, (R5)
                         045E                BRW     30083$
                         045E      30093$:   INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), dsc$l_m2(R2), #0, R5
                         045E                MOVZWL  dsc$w_length(R2), R6
                         045E                INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), R6, R5, R5
                         045E                ADDL    dsc$a_a0(R2), R5
                         045E                MOVF    R0, (R5)
                         045E                BRW     30083$
                         045E      30080$:   CMPB    dsc$b_dimct(R2), #1
                         045E                BNEQ    30095$
                         045E                MOVZWL  dsc$w_length(R2), R6
                         045E                INDEX   R4, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                         045E                ADDL    dsc$a_a0(R2), R5
                         045E                MOVF    R0, (R5)
                         045E                BRW     30083$
                         045E      30095$:   INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), dsc$l_m1(R2), #0, R5
                         045E                MOVZWL  dsc$w_length(R2), R6
                         045E                INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), R6, R5, R5
                         045E                ADDL    dsc$a_a0(R2), R5
                         045E                MOVF    R0, (R5)
                         045E                .IFF
      18    02 A1    91  045E                CMPB    dsc$b_dtype(R1), #dsc$k_dtype_dsc
               41    12  0462                BNEQ    30096$
      50    04 A1    D0  0464                MOVL    4(R1), R0
   0E AE    02 A0    90  0468                MOVB    dsc$b_dtype(R0), dtype(SP)
   0F AE    03 A0    90  046D                MOVB    dsc$b_class(R0), class(SP)
   10 AE    14 AE    DE  0472                MOVAL   data(SP), pointer (SP)
      0C AE    0A    B0  0477                MOVW    #10, str_len(SP)
```

```
                   01   0B A1   91  047B               CMPB     dsc$b_dimct(R1), #1
                           11   12  047F               BNEQ     30098$
                           52   DD  0481               PUSHL    R2
                           51   DD  0483               PUSHL    R1
                        14 AE   DF  0485               PUSHAL   value_desc+8(SP)
             00000000'GF   03   FB  0488               CALLS    #3,G^BAS$STORE_BFA
                         009D   31  048F               BRW      30083$
                           53   DD  0492       30098$: PUSHL    R3
                           52   DD  0494               PUSHL    R2
                           51   DD  0496               PUSHL    R1
                        18 AE   DF  0498               PUSHAL   value_desc+12(SP)
             00000000'GF   04   FB  049B               CALLS    #4,G^BAS$STORE_BFA
                         008A   31  04A2               BRW      30083$
                BF 8F   03 A1   91  04A5       30096$: CMPB     dsc$b_class(R1), #dsc$k_class_bfa
                           09   12  04AA               BNEQ     30081$
                  00000000'GF   16  04AC               JSB      G^BAS$STO_FA_F_R8
                         007A   31  04B2               BRW      30083$
                3C 0A A1   05   E0  04B5       30081$: BBS      #5, 10(R1), 30082$
                   01   0B A1   91  04BA               CMPB     dsc$b_dimct(R1), #1
                           16   12  04BE               BNEQ     30097$
                      55   61   3C  04C0               MOVZWL   dsc$w_length(R1), R5
 00   55   1C A1   18 A1   52   0A  04C3               INDEX    R2, dsc$l_l1_1(R1), dsc$l_u1_1(R1), R5, #0, R4
                           54       04CB
                   54   10 A1   C0  04CC               ADDL     dsc$a_a0(R1), R4
                      64   50   50  04D0               MOVF     R0, (R4)
                         0059   31  04D3               BRW      30083$
   18 A1   20 A1   1C A1   52   0A  04D6       30097$: INDEX    R2, dsc$l_l1_2(R1), dsc$l_u1_2(R1), dsc$l_m2(R1), #0, R4
                      54   00       04DE
                      55   61   3C  04E0               MOVZWL   dsc$w_length(R1), R5
 54   55   28 A1   24 A1   53   0A  04E3               INDEX    R3, dsc$l_l2_2(R1), dsc$l_u2_2(R1), R5, R4, R4
                           54       04EB
                   54   10 A1   C0  04EC               ADDL     dsc$a_a0(R1), R4
                      64   50   50  04F0               MOVF     R0, (R4)
                         0039   31  04F3               BRW      30083$
                   01   0B A1   91  04F6       30082$: CMPB     dsc$b_dimct(R1), #1
                           16   12  04FA               BNEQ     30099$
                      55   61   3C  04FC               MOVZWL   dsc$w_length(R1), R5
 00   55   1C A1   18 A1   53   0A  04FF               INDEX    R3, dsc$l_l1_1(R1), dsc$l_u1_1(R1), R5, #0, R4
                           54       0507
                   54   10 A1   C0  0508               ADDL     dsc$a_a0(R1), R4
                      64   50   50  050C               MOVF     R0, (R4)
                         001D   31  050F               BRW      30083$
   14 A1   28 A1   24 A1   53   0A  0512       30099$: INDEX    R3, dsc$l_l2_2(R1), dsc$l_u2_2(R1), dsc$l_m1(R1), #0, R4
                      54   00       051A
                      55   61   3C  051C               MOVZWL   dsc$w_length(R1), R5
 54   55   20 A1   1C A1   52   0A  051F               INDEX    R2, dsc$l_l1_2(R1), dsc$l_u1_2(R1), R5, R4, R4
                           54       0527
                   54   10 A1   C0  0528               ADDL     dsc$a_a0(R1), R4
                      64   50   50  052C               MOVF     R0, (R4)
                                    052F               .ENDC
                                    052F               .ENDC
                                    052F               .ENDC
                                    052F       30083$:
                                    052F
                           5B   D6  052F               INCL     R11                                ; get next column
                      59   5B   D1  0531               CMPL     R11, R9                            ; see if last column done
                           03   14  0534               BGTR     2$
                        FF13   31  0536              BRW     LOOP_2ND_SUBF           ; no, continue inner loop
                                   0539
                                   0539       ;+
                                   0539       ; Have completed entire row.  See if it was the last row.  If not,
                                   0539       ; continue with next row.
                                   0539       ;-
                                   0539
                       04 AE   D6  0539  2$:        INCL    lower_bnd1(SP)                    ; get next row
                 08 AE 04 AE   D1  053C             CMPL    lower_bnd1(SP), upper_bnd1(SP)    ; see if last row done
                          03   14  0541             BGTR    3$
                        FF03   31  0543             BRW     LOOP_1ST_SUBF           ; no, continue outer loop
                                   0546
                               04  0546  3$:        RET                                       ; yes, finished
                                   0547
```

```
                         0547    379 DOUBLE: $BAS$MAT_INIT D                                  ; expand to double operations
                         0547
                         0547        ;+
                         0547        ;       REGISTER USAGE
                         0547        ;       R0 - R8 destroyed by store routines
                         0547        ;       R9      upper bound for 2nd subscript
                         0547        ;       R10     pointer to array descriptor
                         0547        ;       R11     current value of 2nd subscript
                         0547        ;-
                         0547
                         0547        ;+
                         0547        ; Set up limits for looping through all elements
                         0547        ;-
                         0547
                         0547                .IF     IDN     D, L
                         0547                .IFT                                          ; data type is long
                         0547                MOVL    corstant(AP), -(SP)                   ; move constant
                         0547                .IFF                                          ; data type is not long
    7E   08 AC     6E    0547                CVTLD   constant(AP), -(SP)     ; make constant same datatype
                         054B                                                              ;  as array, save on stack
                         054B                .ENDC
                         054B                .IF     IDN     D, D            ; if array is double
    50   0C AD     D0    054B                MOVL    SF$L_SAVE_FP(FP), R0                  ; pass FP to get scale
 00000000'GF       16    054F                JSB     G^BAS$$SCALE_R1                       ; get scale in R0 & R1
                         0555                                                              ; call a BLISS routine because
                         0555                                                              ; the frame offsets are only
                         0555                                                              ; defined for BLISS
       6E   50     64    0555                MULD2   R0, (SP)                              ; scale
                         0558                .ENDC
                         0558
                         0558        ;+
                         0558        ; Allocate data and value_desc on the stack.  This applies to both
                         0558        ; one and two dimensions.
                         0558        ;-
                         0558
             7E    7C    0558                CLRQ    -(SP)                                 ; space for data
             7E    7C    055A                CLRQ    -(SP)                                 ;  may be hfloat
             7E    7C    055C                CLRQ    -(SP)                                 ; space for value_desc
                         055E
    01   08 AA     91    055E                CMPB    DSC$B_DIMCT(R10), #1                  ; determine # of subscripts
             05    13    0562                BEQLU   INIT_ONE_SUBD           ; 1 sub, go init
             15    1A    0564                BGTRU   INIT_TWO_SUBSD          ; >=2 subs, go init
           FAE1    31    0566                BRW     ERR_ARGDONMAT                         ; 0 subs, error
                         0569
                         0569        ;+
                         0569        ; There is only 1 subscript.  Make both upper and lower bound for 2nd
                         0569        ; subscript a 1.  The second subscript will be passed to and ignored by the
                         0569        ; store routine.
                         0569        ;-
                         0569
                         0569        INIT_ONE_SUBD:
          1C AA    DD    0569                PUSHL   dsc$l_u1_1(R10)                       ; 1st upper bound
          18 AA    DD    056C                PUSHL   dsc$l_l1_1(R10)                       ; 1st lower bound
             03    14    056F                BGTR    1$                                    ; not 0 or neg, do 2nd sub
       6E    01    D0    0571                MOVL    #1, (SP)                              ; don't alter col 0
       59    01    D0    0574        1$:     MOVL    #1, R9                                ; dummy 2nd lower bound
             01    DD    0577                PUSHL   #1                                    ; dummy 2nd upper bound
```

```
                  1A   11  0579            BRB     LOOP_2ND_SUBD           ; go loop
                           057B
                           057B    ;+
                           057B    ; There are 2 subscripts.  Put the upper bound for both subscripts on the
                           057B    ; stack and make sure that the lower bound for both subscripts will start
                           057B    ; at 1 (do not alter row or col 0)
                           057B    ;-
                           057B
                           057B    INIT_TWO_SUBSD:
               20 AA   DD  057B            PUSHL   dsc$l_u1_2(R10)                 ; 1st upper bound
               1C AA   DD  057E            PUSHL   dsc$l_l1_2(R10)                 ; 1st lower bound
                  03   14  0581            BGTR    1$                              ; not row 0 or neg, do cols
            6E    01   D0  0583            MOVL    #1, (SP)                        ; start with row 1
      59       28 AA   D0  0586    1$:     MOVL    dsc$l_u2_2(R10), R9             ; 2nd upper bound
               24 AA   DD  058A            PUSHL   dsc$l_l2_2(R10)                 ; 2nd lower bound
                  03   14  058D            BGTR    LOOP_1ST_SUBD           ; not col 0, go loop
            6E    01   D0  058F            MOVL    #1, (SP)                        ; start with col 1
                           0592
                           0592    ;+
                           0592    ; Loop through all the rows.  Row and column upper and lower bounds have been
                           0592    ; initialized on the stack.
                           0592    ;-
                           0592
                           0592    LOOP_1ST_SUBD:
            5B    6E   D0  0592            MOVL    lower_bnd2(SP), R11             ; R11 has 2nd lower bound
                           0595
                           0595    ;+
                           0595    ; Loop through all the elements (columns) of the current row.  Column lower
                           0595    ; bound is initialized in R11.  Column upper bound is on the stack.
                           0595    ; Distinguish array by data type so that the correct store routine can be
                           0595    ; called and the constant can be converted to the correct type.
                           0595    ;-
                           0595
                           0595    LOOP_2ND_SUBD:
                           0595
      50       24 AE   70  0595            MOVD    constant_cvt(SP), R0    ; put constant into R0
                           0599                                            ;  R0 & R1 for double
                           0599    ;+
                           0599    ; When passed by value, hfloat takes 4 words, gfloat and double take 2 words,
                           0599    ; and all other data types take 1 longword.
                           0599    ;-
                           0599
                           0599            .IF     IDN     D, H            ; data type is hfloat
                           0599            MOVL    R10, R4                         ; pointer to array desc
                           0599            MOVL    lower_bnd1(SP), R5              ; current row
                           0599            MOVL    R11, R6                         ; current column
                           0599            .IFF
                           0599            .IF     IDN     D, G            ; data type is gfloat
                           0599            MOVL    R10, R2                         ; pointer to array desc
                           0599            MOVL    lower_bnd1(SP), R3              ; current row
                           0599            MOVL    R11, R4                         ; current column
                           0599            .IFF
                           0599            .IF     IDN     D, D            ; data type is double
            52    5A   D0  0599            MOVL    R10, R2                         ; pointer to array desc
      53       04 AE   D0  059C            MOVL    lower_bnd1(SP), R3              ; current row
            54    5B   D0  05A0            MOVL    R11, R4                         ; current column
                           05A3            .IFF                                    ; all other data types
                           05A3              MOVL     R10, R1                          ; pointer to array desc
                           05A3              MOVL     lower_bnd1(SP), R2               ; current row
                           05A3              MOVL     R11, R3                          ; current column
                           05A3              .ENDC
                           05A3              .ENDC
                           05A3              .ENDC
          14 AE   50   70  05A3              MOVD     R0, data(SP)            ; store value in value_desc
                           05A7              STORE    D                                ; store in array
                           05A7              .IF      IDN     D, H
                           05A7              CMPB     dsc$b_dtype(R4), #dsc$k_dtype_dsc
                           05A7              BNEQ     30109$
                           05A7              MOVL     4(R4), R0
                           05A7              MOVB     dsc$b_dtype(R0), dtype(SP)
                           05A7              MOVB     dsc$b_class(R0), class(SP)
                           05A7              MOVAL    data(SP), pointer (SP)
                           05A7              MOVW     #10, str_len(SP)
                           05A7              CMPB     dsc$b_dimct(R4), #1
                           05A7              BNEQ     30111$
                           05A7              PUSHL    R5
                           05A7              PUSHL    R4
                           05A7              PUSHAL   value_desc+8(SP)
                           05A7              CALLS    #3,G^BAS$STORE_BFA
                           05A7              BRW      30108$
                           05A7     30111$:  PUSHL    R6
                           05A7              PUSHL    R5
                           05A7              PUSHL    R4
                           05A7              PUSHAL   value_desc+12(SP)
                           05A7              CALLS    #4,G^BAS$STORE_BFA
                           05A7              BRW      30108$
                           05A7     30109$:  CMPB     dsc$b_class(R4), #dsc$k_class_bfa
                           05A7              BNEQ     30100$
                           05A7              JSB      G^BAS$STO_FA_D_R8
                           05A7              BRW      30108$
                           05A7     30100$:  BBS      #5, 10(R4), 30101$
                           05A7              CMPB     dsc$b_dimct(R4), #1
                           05A7              BNEQ     30110$
                           05A7              MOVZWL   dsc$w_length(R4), R8
                           05A7              INDEX    R5, dsc$l_l1_1(R4), dsc$l_u1_1(R4), R8, #0, R7
                           05A7              ADDL     dsc$a_a0(R4), R7
                           05A7              MOVD     R0, (R7)
                           05A7              BRW      30108$
                           05A7     30110$:  INDEX    R5, dsc$l_l1_2(R4), dsc$l_u1_2(R4), dsc$l_m2(R4), #0, R7
                           05A7              MOVZWL   dsc$w_length(R4), R8
                           05A7              INDEX    R6, dsc$l_l2_2(R4), dsc$l_u2_2(R4), R8, R7, R7
                           05A7              ADDL     dsc$a_a0(R4), R7
                           05A7              MOVD     R0, (R7)
                           05A7              BRW      30108$
                           05A7     30101$:  CMPB     dsc$b_dimct(R4), #1
                           05A7              BNEQ     30112$
                           05A7              MOVZWL   dsc$w_length(R4), R8
                           05A7              INDEX    R6, dsc$l_l1_1(R4), dsc$l_u1_1(R4), R8, #0, R7
                           05A7              ADDL     dsc$a_a0(R4), R7
                           05A7              MOVD     R0, (R7)
                           05A7              BRW      30108$
                           05A7     30112$:  INDEX    R6, dsc$l_l2_2(R4), dsc$l_u2_2(R4), dsc$l_m1(R4), #0, R7
                           05A7              MOVZWL   dsc$w_length(R4), R8
                           05A7              INDEX    R5, dsc$l_l1_2(R4), dsc$l_u1_2(R4), R8, R7, R7
```

```
                     05A7              ADDL    dsc$a_a0(R4), R7
                     05A7              MOVD    R0, (R7)
                     05A7              .IFF
                     05A7              .IF     IDN     D, G
                     05A7              CMPB    dsc$b_dtype(R2), #dsc$k_dtype_dsc
                     05A7              BNEQ    30113$
                     05A7              MOVL    4(R2), R0
                     05A7              MOVB    dsc$b_dtype(R0), dtype(SP)
                     05A7              MOVB    dsc$b_class(R0), class(SP)
                     05A7              MOVAL   data(SP), pointer (SP)
                     05A7              MOVW    #10, str_len(SP)
                     05A7              CMPB    dsc$b_dimct(R2), #1
                     05A7              BNEQ    30115$
                     05A7              PUSHL   R3
                     05A7              PUSHL   R2
                     05A7              PUSHAL  value_desc+8(SP)
                     05A7              CALLS   #3,G^BAS$STORE_BFA
                     05A7              BRW     30108$
                     05A7     30115$:  PUSHL   R4
                     05A7              PUSHL   R3
                     05A7              PUSHL   R2
                     05A7              PUSHAL  value_desc+12(SP)
                     05A7              CALLS   #4,G^BAS$STORE_BFA
                     05A7              BRW     30108$
                     05A7     30113$:  CMPB    dsc$b_class(R2), #dsc$k_class_bfa
                     05A7              BNEQ    30102$
                     05A7              JSB     G^BAS$STO_FA_D_R8
                     05A7              BRW     30108$
                     05A7     30102$:  BBS     #5, 10(R2), 30103$
                     05A7              CMPB    dsc$b_dimct(R2), #1
                     05A7              BNEQ    30114$
                     05A7              MOVZWL  dsc$w_length(R2), R6
                     05A7              INDEX   R3, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                     05A7              ADDL    dsc$a_a0(R2), R5
                     05A7              MOVD    R0, (R5)
                     05A7              BRW     30108$
                     05A7     30114$:  INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), dsc$l_m2(R2), #0, R5
                     05A7              MOVZWL  dsc$w_length(R2), R6
                     05A7              INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), R6, R5, R5
                     05A7              ADDL    dsc$a_a0(R2), R5
                     05A7              MOVD    R0, (R5)
                     05A7              BRW     30108$
                     05A7     30103$:  CMPB    dsc$b_dimct(R2), #1
                     05A7              BNEQ    30116$
                     05A7              MOVZWL  dsc$w_length(R2), R6
                     05A7              INDEX   R4, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                     05A7              ADDL    dsc$a_a0(R2), R5
                     05A7              MOVD    R0, (R5)
                     05A7              BRW     30108$
                     05A7     30116$:  INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), dsc$l_m1(R2), #0, R5
                     05A7              MOVZWL  dsc$w_length(R2), R6
                     05A7              INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), R6, R5, R5
                     05A7              ADDL    dsc$a_a0(R2), R5
                     05A7              MOVD    R0, (R5)
                     05A7              .IFF
                     05A7              .IF     IDN     D, D
   18   02 A2   91   05A7              CMPB    dsc$b_dtype(R2), #dsc$k_dtype_dsc
```

```
                                  41   12  05AB          BNEQ     30117$
                          50   04 A2   D0  05AD          MOVL     4(R2), R0
                       0E AE   02 A0   90  05B1          MOVB     dsc$b_dtype(R0), dtype(SP)
                       0F AE   03 A0   90  05B6          MOVB     dsc$b_class(R0), class(SP)
                       10 AE   14 AE   DE  05BB          MOVAL    data(SP), pointer (SP)
                       0C AE      0A   B0  05C0          MOVW     #10, str_len(SP)
                       01      0B A2   91  05C4          CMPB     dsc$b_dimct(R2), #1
                                  11   12  05C8          BNEQ     30119$
                                  53   DD  05CA          PUSHL    R3
                                  52   DD  05CC          PUSHL    R2
                               14 AE   DF  05CE          PUSHAL   value_desc+8(SP)
                    00000000'GF   03   FB  05D1          CALLS    #3,G^BAS$STORE_BFA
                                009D   31  05D8          BRW      30108$
                                  54   DD  05DB  30119$: PUSHL    R4
                                  53   DD  05DD          PUSHL    R3
                                  52   DD  05DF          PUSHL    R2
                               18 AE   DF  05E1          PUSHAL   value_desc+12(SP)
                    00000000'GF   04   FB  05E4          CALLS    #4,G^BAS$STORE_BFA
                                008A   31  05EB          BRW      30108$
                       BF 8F   03 A2   91  05EE  30117$: CMPB     dsc$b_class(R2), #dsc$k_class_bfa
                                  09   12  05F3          BNEQ     30104$
                         00000000'GF   16  05F5          JSB      G^BAS$STO_FA_D_R8
                                007A   31  05FB          BRW      30108$
                       3C 0A A2   05   E0  05FE  30104$: BBS      #5, 10(R2), 30105$
                       01      0B A2   91  0603          CMPB     dsc$b_dimct(R2), #1
                                  16   12  0607          BNEQ     30118$
                             56   62   3C  0609          MOVZWL   dsc$w_length(R2), R6
     00    56    1C A2    18 A2   53   0A  060C          INDEX    R3, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                                  55       0614
                          55   10 A2   C0  0615          ADDL     dsc$a_a0(R2), R5
                             65   50   70  0619          MOVD     R0, (R5)
                                0059   31  061C          BRW      30108$
        18 A2    20 A2    1C A2   53   0A  061F  30118$: INDEX    R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), dsc$l_m2(R2), #0, R5
                             55   00       0627
                             56   62   3C  0629          MOVZWL   dsc$w_length(R2), R6
     55    56    28 A2    24 A2   54   0A  062C          INDEX    R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), R6, R5, R5
                                  55       0634
                          55   10 A2   C0  0635          ADDL     dsc$a_a0(R2), R5
                             65   50   70  0639          MOVD     R0, (R5)
                                0039   31  063C          BRW      30108$
                       01      0B A2   91  063F  30105$: CMPB     dsc$b_dimct(R2), #1
                                  16   12  0643          BNEQ     30120$
                             56   62   3C  0645          MOVZWL   dsc$w_length(R2), R6
     00    56    1C A2    18 A2   54   0A  0648          INDEX    R4, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                                  55       0650
                          55   10 A2   C0  0651          ADDL     dsc$a_a0(R2), R5
                             65   50   70  0655          MOVD     R0, (R5)
                                001D   31  0658          BRW      30108$
        14 A2    28 A2    24 A2   54   0A  065B  30120$: INDEX    R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), dsc$l_m1(R2), #0, R5
                             55   00       0663
                             56   62   3C  0665          MOVZWL   dsc$w_length(R2), R6
     55    56    20 A2    1C A2   53   0A  0668          INDEX    R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), R6, R5, R5
                                  55       0670
                          55   10 A2   C0  0671          ADDL     dsc$a_a0(R2), R5
                             65   50   70  0675          MOVD     R0, (R5)
                                           0678          .IFF
                                           0678          CMPB     dsc$b_dtype(R1), #dsc$k_dtype_dsc
                    0678              BNEQ    30121$
                    0678              MOVL    4(R1), R0
                    0678              MOVB    dsc$b_dtype(R0), dtype(SP)
                    0678              MOVB    dsc$b_class(R0), class(SP)
                    0678              MOVAL   data(SP), pointer (SP)
                    0678              MOVW    #10, str_len(SP)
                    0678              CMPB    dsc$b_dimct(R1), #1
                    0678              BNEQ    30123$
                    0678              PUSHL   R2
                    0678              PUSHL   R1
                    0678              PUSHAL  value_desc+8(SP)
                    0678              CALLS   #3,G^BAS$STORE_BFA
                    0678              BRW     30108$
                    0678     30123$:  PUSHL   R3
                    0678              PUSHL   R2
                    0678              PUSHL   R1
                    0678              PUSHAL  value_desc+12(SP)
                    0678              CALLS   #4,G^BAS$STORE_BFA
                    0678              BRW     30108$
                    0678     30121$:  CMPB    dsc$b_class(R1), #dsc$k_class_bfa
                    0678              BNEQ    30106$
                    0678              JSB     G^BAS$STO_FA_D_R8
                    0678              BRW     30108$
                    0678     30106$:  BBS     #5, 10(R1), 30107$
                    0678              CMPB    dsc$b_dimct(R1), #1
                    0678              BNEQ    30122$
                    0678              MOVZWL  dsc$w_length(R1), R5
                    0678              INDEX   R2, dsc$l_l1_1(R1), dsc$l_u1_1(R1), R5, #0, R4
                    0678              ADDL    dsc$a_a0(R1), R4
                    0678              MOVD    R0, (R4)
                    0678              BRW     30108$
                    0678     30122$:  INDEX   R2, dsc$l_l1_2(R1), dsc$l_u1_2(R1), dsc$l_m2(R1), #0, R4
                    0678              MOVZWL  dsc$w_length(R1), R5
                    0678              INDEX   R3, dsc$l_l2_2(R1), dsc$l_u2_2(R1), R5, R4, R4
                    0678              ADDL    dsc$a_a0(R1), R4
                    0678              MOVD    R0, (R4)
                    0678              BRW     30108$
                    0678     30107$:  CMPB    dsc$b_dimct(R1), #1
                    0678              BNEQ    30124$
                    0678              MOVZWL  dsc$w_length(R1), R5
                    0678              INDEX   R3, dsc$l_l1_1(R1), dsc$l_u1_1(R1), R5, #0, R4
                    0678              ADDL    dsc$a_a0(R1), R4
                    0678              MOVD    R0, (R4)
                    0678              BRW     30108$
                    0678     30124$:  INDEX   R3, dsc$l_l2_2(R1), dsc$l_u2_2(R1), dsc$l_m1(R1), #0, R4
                    0678              MOVZWL  dsc$w_length(R1), R5
                    0678              INDEX   R2, dsc$l_l1_2(R1), dsc$l_u1_2(R1), R5, R4, R4
                    0678              ADDL    dsc$a_a0(R1), R4
                    0678              MOVD    R0, (R4)
                    0678              .ENDC
                    0678              .ENDC
                    0678              .ENDC
                    0678     30108$:
                    0678
         5B   D6    0678              INCL    R11                                     ; get next column
    59   5B   D1    067A              CMPL    R11, R9                                 ; see if last column done
         03   14    067D              BGTR    2$
```

```
                    FF13   31  067F          BRW    LOOP_2ND_SUBD              ; no, continue inner loop
                               0682
                               0682   ;+
                               0682   ; Have completed entire row.  See if it was the last row.  If not,
                               0682   ; continue with next row.
                               0682   ;-
                               0682
                   04 AE   D6  0682   2$:    INCL   lower_bnd1(SP)                     ; get next row
             08 AE 04 AE   D1  0685          CMPL   lower_bnd1(SP), upper_bnd1(SP)     ; see if last row done
                      03   14  068A          BGTR   3$
                    FF03   31  068C          BRW    LOOP_1ST_SUBD              ; no, continue outer loop
                               068F
                      04       068F   3$:    RET                               ; yes, finished
                               0690
```

```
                       0690   381 GFLOAT: $BAS$MAT_INIT G                              ; expand to gfloat operations
                       0690
                       0690           ;+
                       0690           ;             REGISTER USAGE
                       0690           ;             R0 - R8 destroyed by store routines
                       0690           ;             R9      upper bound for 2nd subscript
                       0690           ;             R10     pointer to array descriptor
                       0690           ;             R11     current value of 2nd subscript
                       0690           ;-
                       0690
                       0690           ;+
                       0690           ; Set up limits for looping through all elements
                       0690           ;-
                       0690
                       0690                   .IF     IDN     G, L
                       0690                   .IFT                                     ; data type is long
                       0690                   MOVL    constant(AP), -(SP)              ; move constant
                       0690                   .IFF                                     ; data type is not long
     7E   08 AC 4EFD   0690                   CVTLG   constant(AP), -(SP)     ; make constant same datatype
                       0695                                                            ;  as array, save on stack
                       0695                   .ENDC
                       0695                   .IF     IDN     G, D            ; if array is double
                       0695                   MOVL    SF$L_SAVE_FP(FP), R0             ; pass FP to get scale
                       0695                   JSB     G^BAS$$SCALE_R1                  ; get scale in R0 & R1
                       0695                                                            ; call a BLISS routine because
                       0695                                                            ; the frame offsets are only
                       0695                                                            ; defined for BLISS
                       0695                   MULD2   R0, (SP)                         ; scale
                       0695                   .ENDC
                       0695
                       0695           ;+
                       0695           ; Allocate data and value_desc on the stack.  This applies to both
                       0695           ; one and two dimensions.
                       0695           ;-
                       0695
             7E   7C   0695                   CLRQ    -(SP)                            ; space for data
             7E   7C   0697                   CLRQ    -(SP)                            ;  may be hfloat
             7E   7C   0699                   CLRQ    -(SP)                            ; space for value_desc
                       069B
     01   0B AA   91   069B                   CMPB    DSC$B_DIMCT(R10), #1             ; determine # of subscripts
             05   13   069F                   BEQLU   INIT_ONE_SUBG           ; 1 sub, go init
             15   1A   06A1                   BGTRU   INIT_TWO_SUBSG          ; >=2 subs, go init
           F9A4   31   06A3                   BRW     ERR_ARGDONMAT                    ; 0 subs, error
                       06A6
                       06A6           ;+
                       06A6           ; There is only 1 subscript.  Make both upper and lower bound for 2nd
                       06A6           ; subscript a 1.  The second subscript will be passed to and ignored by the
                       06A6           ; store routine.
                       06A6           ;-
                       06A6
                       06A6           INIT_ONE_SUBG:
          1C AA   DD   06A6                   PUSHL   dsc$l_u1_1(R10)                  ; 1st upper bound
          18 AA   DD   06A9                   PUSHL   dsc$l_l1_1(R10)                  ; 1st lower bound
             03   14   06AC                   BGTR    1$                               ; not 0 or neg, do 2nd sub
          6E 01   D0   06AE                   MOVL    #1, (SP)                         ; don't alter col 0
          59 01   D0   06B1           1$:     MOVL    #1, R9                           ; dummy 2nd lower bound
             01   DD   06B4                   PUSHL   #1                               ; dummy 2nd upper bound
```

```
            1A   11  06B6            BRB     LOOP_2ND_SUBG           ; go loop
                     06B8
                     06B8    ;+
                     06B8    ; There are 2 subscripts.  Put the upper bound for both subscripts on the
                     06B8    ; stack and make sure that the lower bound for both subscripts will start
                     06B8    ; at 1 (do not alter row or col 0)
                     06B8    ;-
                     06B8
                     06B8    INIT_TWO_SUBSG:
         20 AA   DD  06B8            PUSHL   dsc$l_u1_2(R10)                 ; 1st upper bound
         1C AA   DD  06BB            PUSHL   dsc$l_l1_2(R10)                 ; 1st lower bound
            03   14  06BE            BGTR    1$                              ; not row 0 or neg, do cols
       6E   01   D0  06C0            MOVL    #1, (SP)                        ; start with row 1
  59     28 AA   D0  06C3    1$:     MOVL    dsc$l_u2_2(R10), R9             ; 2nd upper bound
         24 AA   DD  06C7            PUSHL   dsc$l_l2_2(R10)                 ; 2nd lower bound
            03   14  06CA            BGTR    LOOP_1ST_SUBG           ; not col 0, go loop
       6E   01   D0  06CC            MOVL    #1, (SP)                        ; start with col 1
                     06CF
                     06CF    ;+
                     06CF    ; Loop through all the rows.  Row and column upper and lower bounds have been
                     06CF    ; initialized on the stack.
                     06CF    ;-
                     06CF
                     06CF    LOOP_1ST_SUBG:
       5B   6E   D0  06CF            MOVL    lower_bnd2(SP), R11             ; R11 has 2nd lower bound
                     06D2
                     06D2    ;+
                     06D2    ; Loop through all the elements (columns) of the current row.  Column lower
                     06D2    ; bound is initialized in R11.  Column upper bound is on the stack.
                     06D2    ; Distinguish array by data type so that the correct store routine can be
                     06D2    ; called and the constant can be converted to the correct type.
                     06D2    ;-
                     06D2
                     06D2    LOOP_2ND_SUBG:
                     06D2
  50     24 AE 50FD  06D2            MOVG    constant_cvt(SP), R0    ; put constant into R0
                     06D7                                                    ;  R0 & R1 for double
                     06D7    ;+
                     06D7    ; When passed by value, hfloat takes 4 words, gfloat and double take 2 words,
                     06D7    ; and all other data types take 1 longword.
                     06D7    ;-
                     06D7
                     06D7            .IF     IDN     G, H            ; data type is hfloat
                     06D7            MOVL    R10, R4                         ; pointer to array desc
                     06D7            MOVL    lower_bnd1(SP), R5              ; current row
                     06D7            MOVL    R11, R6                         ; current column
                     06D7            .IFF
                     06D7            .IF     IDN     G, G            ; data type is gfloat
       52   5A   D0  06D7            MOVL    R10, R2                         ; pointer to array desc
  53     04 AE   D0  06DA            MOVL    lower_bnd1(SP), R3              ; current row
       54   5B   D0  06DE            MOVL    R11, R4                         ; current column
                     06E1            .IFF
                     06E1            .IF     IDN     G, D            ; data type is double
                     06E1            MOVL    R10, R2                         ; pointer to array desc
                     06E1            MOVL    lower_bnd1(SP), R3              ; current row
                     06E1            MOVL    R11, R4                         ; current column
                     06E1            .IFF                                    ; all other data types
```

```
                        06E1              MOVL    R10, R1                         ; pointer to array desc
                        06E1              MOVL    lower_bnd1(SP), R2              ; current row
                        06E1              MOVL    R11, R3                         ; current column
                        06E1              .ENDC
                        06E1              .ENDC
                        06E1              .ENDC
      14 AE   50 50FD   06E1              MOVG    R0, data(SP)               ; store value in value_desc
                        06E6              STORE   G                               ; store in array
                        06E6              .IF     IDN     G, H
                        06E6              CMPB    dsc$b_dtype(R4), #dsc$k_dtype_dsc
                        06E6              BNEQ    30134$
                        06E6              MOVL    4(R4), R0
                        06E6              MOVB    dsc$b_dtype(R0), dtype(SP)
                        06E6              MOVB    dsc$b_class(R0), class(SP)
                        06E6              MOVAL   data(SP), pointer (SP)
                        06E6              MOVW    #10, str_len(SP)
                        06E6              CMPB    dsc$b_dimct(R4), #1
                        06E6              BNEQ    30136$
                        06E6              PUSHL   R5
                        06E6              PUSHL   R4
                        06E6              PUSHAL  value_desc+8(SP)
                        06E6              CALLS   #3,G^BAS$STORE_BFA
                        06E6              BRW     30133$
                        06E6     30136$:  PUSHL   R6
                        06E6              PUSHL   R5
                        06E6              PUSHL   R4
                        06E6              PUSHAL  value_desc+12(SP)
                        06E6              CALLS   #4,G^BAS$STORE_BFA
                        06E6              BRW     30133$
                        06E6     30134$:  CMPB    dsc$b_class(R4), #dsc$k_class_bfa
                        06E6              BNEQ    30125$
                        06E6              JSB     G^BAS$STO_FA_G_R8
                        06E6              BRW     30133$
                        06E6     30125$:  BBS     #5, 10(R4), 30126$
                        06E6              CMPB    dsc$b_dimct(R4), #1
                        06E6              BNEQ    30135$
                        06E6              MOVZWL  dsc$w_length(R4), R8
                        06E6              INDEX   R5, dsc$l_l1_1(R4), dsc$l_u1_1(R4), R8, #0, R7
                        06E6              ADDL    dsc$a_a0(R4), R7
                        06E6              MOVG    R0, (R7)
                        06E6              BRW     30133$
                        06E6     30135$:  INDEX   R5, dsc$l_l1_2(R4), dsc$l_u1_2(R4), dsc$l_m2(R4), #0, R7
                        06E6              MOVZWL  dsc$w_length(R4), R8
                        06E6              INDEX   R6, dsc$l_l2_2(R4), dsc$l_u2_2(R4), R8, R7, R7
                        06E6              ADDL    dsc$a_a0(R4), R7
                        06E6              MOVG    R0, (R7)
                        06E6              BRW     30133$
                        06E6     30126$:  CMPB    dsc$b_dimct(R4), #1
                        06E6              BNEQ    30137$
                        06E6              MOVZWL  dsc$w_length(R4), R8
                        06E6              INDEX   R6, dsc$l_l1_1(R4), dsc$l_u1_1(R4), R8, #0, R7
                        06E6              ADDL    dsc$a_a0(R4), R7
                        06E6              MOVG    R0, (R7)
                        06E6              BRW     30133$
                        06E6     30137$:  INDEX   R6, dsc$l_l2_2(R4), dsc$l_u2_2(R4), dsc$l_m1(R4), #0, R7
                        06E6              MOVZWL  dsc$w_length(R4), R8
                        06E6              INDEX   R5, dsc$l_l1_2(R4), dsc$l_u1_2(R4), R8, R7, R7
```

```
                                     06E6                ADDL    dsc$a_a0(R4), R7
                                     06E6                MOVG    R0, (R7)
                                     06E6                .IFF
                                     06E6                .IF     IDN     G, G
                    18    02 A2  91  06E6                CMPB    dsc$b_dtype(R2), #dsc$k_dtype_dsc
                             41  12  06EA                BNEQ    30138$
                    50    04 A2  D0  06EC                MOVL    4(R2), R0
                 0E AE    02 A0  90  06F0                MOVB    dsc$b_dtype(R0), dtype(SP)
                 0F AE    03 A0  90  06F5                MOVB    dsc$b_class(R0), class(SP)
                 10 AE    14 AE  DE  06FA                MOVAL   data(SP), pointer (SP)
                    0C AE    0A  B0  06FF                MOVW    #10, str_len(SP)
                    01    0B A2  91  0703                CMPB    dsc$b_dimct(R2), #1
                             11  12  0707                BNEQ    30140$
                             53  DD  0709                PUSHL   R3
                             52  DD  070B                PUSHL   R2
                          14 AE  DF  070D                PUSHAL  value_desc+8(SP)
               00000000'GF   03  FB  0710                CALLS   #3,G^BAS$STORE_BFA
                           00A1  31  0717                BRW     30133$
                             54  DD  071A       30140$:  PUSHL   R4
                             53  DD  071C                PUSHL   R3
                             52  DD  071E                PUSHL   R2
                          18 AE  DF  0720                PUSHAL  value_desc+12(SP)
               00000000'GF   04  FB  0723                CALLS   #4,G^BAS$STORE_BFA
                           008E  31  072A                BRW     30133$
                 BF 8F    03 A2  91  072D       30138$:  CMPB    dsc$b_class(R2), #dsc$k_class_bfa
                             09  12  0732                BNEQ    30127$
                    00000000'GF  16  0734                JSB     G^BAS$STO_FA_G_R8
                           007E  31  073A                BRW     30133$
                 3E 0A A2    05  E0  073D       30127$:  BBS     #5, 10(R2), 30128$
                    01    0B A2  91  0742                CMPB    dsc$b_dimct(R2), #1
                             17  12  0746                BNEQ    30139$
                       56    62  3C  0748                MOVZWL  dsc$w_length(R2), R6
  00    56    1C A2    18 A2 53  0A  074B                INDEX   R3, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                             55      0753
                    55    10 A2  C0  0754                ADDL    dsc$a_a0(R2), R5
                       65    50 50FD 0758                MOVG    R0, (R5)
                           005C  31  075C                BRW     30133$
   18 A2    20 A2    1C A2   53  0A  075F       30139$:  INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), dsc$l_m2(R2), #0, R5
                       55    00      0767
                       56    62  3C  0769                MOVZWL  dsc$w_length(R2), R6
  55    56    28 A2    24 A2 54  0A  076C                INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), R6, R5, R5
                             55      0774
                    55    10 A2  C0  0775                ADDL    dsc$a_a0(R2), R5
                       65    50 50FD 0779                MOVG    R0, (R5)
                           003B  31  077D                BRW     30133$
                    01    0B A2  91  0780       30128$:  CMPB    dsc$b_dimct(R2), #1
                             17  12  0784                BNEQ    30141$
                       56    62  3C  0786                MOVZWL  dsc$w_length(R2), R6
  00    56    1C A2    18 A2 54  0A  0789                INDEX   R4, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                             55      0791
                    55    10 A2  C0  0792                ADDL    dsc$a_a0(R2), R5
                       65    50 50FD 0796                MOVG    R0, (R5)
                           001E  31  079A                BRW     30133$
   14 A2    28 A2    24 A2   54  0A  079D       30141$:  INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), dsc$l_m1(R2), #0, R5
                       55    00      07A5
                       56    62  3C  07A7                MOVZWL  dsc$w_length(R2), R6
  55    56    20 A2    1C A2 53  0A  07AA                INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), R6, R5, R5
```

```
                    55      07B2
         55  10  A2   C0    07B3                ADDL    dsc$a_a0(R2), R5
            65    50 50FD   07B7                MOVG    R0, (R5)
                            07BB                .IFF
                            07BB                .IF     IDN     G, D
                            07BB                CMPB    dsc$b_dtype(R2), #dsc$k_dtype_dsc
                            07BB                BNEQ    30142$
                            07BB                MOVL    4(R2), R0
                            07BB                MOVB    dsc$b_dtype(R0), dtype(SP)
                            07BB                MOVB    dsc$b_class(R0), class(SP)
                            07BB                MOVAL   data(SP), pointer (SP)
                            07BB                MOVW    #10, str_len(SP)
                            07BB                CMPB    dsc$b_dimct(R2), #1
                            07BB                BNEQ    30144$
                            07BB                PUSHL   R3
                            07BB                PUSHL   R2
                            07BB                PUSHAL  value_desc+8(SP)
                            07BB                CALLS   #3,G^BAS$STORE_BFA
                            07BB                BRW     30133$
                            07BB        30144$: PUSHL   R4
                            07BB                PUSHL   R3
                            07BB                PUSHL   R2
                            07BB                PUSHAL  value_desc+12(SP)
                            07BB                CALLS   #4,G^BAS$STORE_BFA
                            07BB                BRW     30133$
                            07BB        30142$: CMPB    dsc$b_class(R2), #dsc$k_class_bfa
                            07BB                BNEQ    30129$
                            07BB                JSB     G^BAS$STO_FA_G_R8
                            07BB                BRW     30133$
                            07BB        30129$: BBS     #5, 10(R2), 30130$
                            07BB                CMPB    dsc$b_dimct(R2), #1
                            07BB                BNEQ    30143$
                            07BB                MOVZWL  dsc$w_length(R2), R6
                            07BB                INDEX   R3, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                            07BB                ADDL    dsc$a_a0(R2), R5
                            07BB                MOVG    R0, (R5)
                            07BB                BRW     30133$
                            07BB        30143$: INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), dsc$l_m2(R2), #0, R5
                            07BB                MOVZWL  dsc$w_length(R2), R6
                            07BB                INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), R6, R5, R5
                            07BB                ADDL    dsc$a_a0(R2), R5
                            07BB                MOVG    R0, (R5)
                            07BB                BRW     30133$
                            07BB        30130$: CMPB    dsc$b_dimct(R2), #1
                            07BB                BNEQ    30145$
                            07BB                MOVZWL  dsc$w_length(R2), R6
                            07BB                INDEX   R4, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                            07BB                ADDL    dsc$a_a0(R2), R5
                            07BB                MOVG    R0, (R5)
                            07BB                BRW     30133$
                            07BB        30145$: INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), dsc$l_m1(R2), #0, R5
                            07BB                MOVZWL  dsc$w_length(R2), R6
                            07BB                INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), R6, R5, R5
                            07BB                ADDL    dsc$a_a0(R2), R5
                            07BB                MOVG    R0, (R5)
                            07BB                .IFF
                            07BB                CMPB    dsc$b_dtype(R1), #dsc$k_dtype_dsc
```

```
                 07BB                  BNEQ    30146$
                 07BB                  MOVL    4(R1), R0
                 07BB                  MOVB    dsc$b_dtype(R0), dtype(SP)
                 07BB                  MOVB    dsc$b_class(R0), class(SP)
                 07BB                  MOVAL   data(SP), pointer (SP)
                 07BB                  MOVW    #10, str_len(SP)
                 07BB                  CMPB    dsc$b_dimct(R1), #1
                 07BB                  BNEQ    30148$
                 07BB                  PUSHL   R2
                 07BB                  PUSHL   R1
                 07BB                  PUSHAL  value_desc+8(SP)
                 07BB                  CALLS   #3,G^BAS$STORE_BFA
                 07BB                  BRW     30133$
                 07BB         30148$:  PUSHL   R3
                 07BB                  PUSHL   R2
                 07BB                  PUSHL   R1
                 07BB                  PUSHAL  value_desc+12(SP)
                 07BB                  CALLS   #4,G^BAS$STORE_BFA
                 07BB                  BRW     30133$
                 07BB         30146$:  CMPB    dsc$b_class(R1), #dsc$k_class_bfa
                 07BB                  BNEQ    30131$
                 07BB                  JSB     G^BAS$STO_FA_G_R8
                 07BB                  BRW     30133$
                 07BB         30131$:  BBS     #5, 10(R1), 30132$
                 07BB                  CMPB    dsc$b_dimct(R1), #1
                 07BB                  BNEQ    30147$
                 07BB                  MOVZWL  dsc$w_length(R1), R5
                 07BB                  INDEX   R2, dsc$l_l1_1(R1), dsc$l_u1_1(R1), R5, #0, R4
                 07BB                  ADDL    dsc$a_a0(R1), R4
                 07BB                  MOVG    R0, (R4)
                 07BB                  BRW     30133$
                 07BB         30147$:  INDEX   R2, dsc$l_l1_2(R1), dsc$l_u1_2(R1), dsc$l_m2(R1), #0, R4
                 07BB                  MOVZWL  dsc$w_length(R1), R5
                 07BB                  INDEX   R3, dsc$l_l2_2(R1), dsc$l_u2_2(R1), R5, R4, R4
                 07BB                  ADDL    dsc$a_a0(R1), R4
                 07BB                  MOVG    R0, (R4)
                 07BB                  BRW     30133$
                 07BB         30132$:  CMPB    dsc$b_dimct(R1), #1
                 07BB                  BNEQ    30149$
                 07BB                  MOVZWL  dsc$w_length(R1), R5
                 07BB                  INDEX   R3, dsc$l_l1_1(R1), dsc$l_u1_1(R1), R5, #0, R4
                 07BB                  ADDL    dsc$a_a0(R1), R4
                 07BB                  MOVG    R0, (R4)
                 07BB                  BRW     30133$
                 07BB         30149$:  INDEX   R3, dsc$l_l2_2(R1), dsc$l_u2_2(R1), dsc$l_m1(R1), #0, R4
                 07BB                  MOVZWL  dsc$w_length(R1), R5
                 07BB                  INDEX   R2, dsc$l_l1_2(R1), dsc$l_u1_2(R1), R5, R4, R4
                 07BB                  ADDL    dsc$a_a0(R1), R4
                 07BB                  MOVG    R0, (R4)
                 07BB                  .ENDC
                 07BB                  .ENDC
                 07BB                  .ENDC
                 07BB         30133$:
                 07BB
      5B   D6    07BB                  INCL    R11                               ; get next column
 59   5B   D1    07BD                  CMPL    R11, R9                           ; see if last column done
      03   14    07C0                  BGTR    2$
```

```
                FF0D   31  07C2            BRW     LOOP_2ND_SUBG           ; no, continue inner loop
                           07C5
                           07C5    ;+
                           07C5    ; Have completed entire row.  See if it was the last row.  If not,
                           07C5    ; continue with next row.
                           07C5    ;-
                           07C5
               04 AE   D6  07C5    2$:     INCL    lower_bnd1(SP)                  ; get next row
        08 AE  04 AE   D1  07C8            CMPL    lower_bnd1(SP), upper_bnd1(SP)  ; see if last row done
                  03   14  07CD            BGTR    3$
                FEFD   31  07CF            BRW     LOOP_1ST_SUBG           ; no, continue outer loop
                           07D2
                       04  07D2    3$:     RET                                     ; yes, finished
                           07D3
```

```
                        07D3   HFLOAT: $BAS$MAT_INIT H                            ; expand to hfloat operations
                        07D3
                        07D3           ;+
                        07D3           ;       REGISTER USAGE
                        07D3           ;       R0 - R8 destroyed by store routines
                        07D3           ;       R9      upper bound for 2nd subscript
                        07D3           ;       R10     pointer to array descriptor
                        07D3           ;       R11     current value of 2nd subscript
                        07D3           ;-
                        07D3
                        07D3           ;+
                        07D3           ; Set up limits for looping through all elements
                        07D3           ;-
                        07D3
                        07D3                   .IF     IDN     H, L
                        07D3                   .IFT                                       ; data type is long
                        07D3                   MOVL    constant(AP), -(SP)                ; move constant
                        07D3                   .IFF                                       ; data type is not long
  7E    08 AC 6EFD      07D3                   CVTLH   constant(AP), -(SP)     ; make constant same datatype
                        07D8                                                              ;  as array, save on stack
                        07D8                   .ENDC
                        07D8                   .IF     IDN     H, D            ; if array is double
                        07D8                   MOVL    SF$L_SAVE_FP(FP), R0               ; pass FP to get scale
                        07D8                   JSB     G^BAS$$SCALE_R1                    ; get scale in R0 & R1
                        07D8                                                              ; call a BLISS routine because
                        07D8                                                              ; the frame offsets are only
                        07D8                                                              ; defined for BLISS
                        07D8                   MULD2   R0, (SP)                           ; scale
                        07D8                   .ENDC
                        07D8
                        07D8           ;+
                        07D8           ; Allocate data and value_desc on the stack.  This applies to both
                        07D8           ; one and two dimensions.
                        07D8           ;-
                        07D8
            7E    7C    07D8                   CLRQ    -(SP)                              ; space for data
            7E    7C    07DA                   CLRQ    -(SP)                              ;  may be hfloat
            7E    7C    07DC                   CLRQ    -(SP)                              ; space for value_desc
                        07DE
  01    0B AA     91    07DE                   CMPB    DSC$B_DIMCT(R10), #1               ; determine # of subscripts
            05    13    07E2                   BEQLU   INIT_ONE_SUBH           ; 1 sub, go init
            15    1A    07E4                   BGTRU   INIT_TWO_SUBSH          ; >=2 subs, go init
          F861    31    07E6                   BRW     ERR_ARGDONMAT                      ; 0 subs, error
                        07E9
                        07E9           ;+
                        07E9           ; There is only 1 subscript.  Make both upper and lower bound for 2nd
                        07E9           ; subscript a 1.  The second subscript will be passed to and ignored by the
                        07E9           ; store routine.
                        07E9           ;-
                        07E9
                        07E9           INIT_ONE_SUBH:
         1C AA    DD    07E9                   PUSHL   dsc$l_u1_1(R10)                    ; 1st upper bound
         18 AA    DD    07EC                   PUSHL   dsc$l_l1_1(R10)                    ; 1st lower bound
            03    14    07EF                   BGTR    1$                                 ; not 0 or neg, do 2nd sub
      6E    01    D0    07F1                   MOVL    #1, (SP)                           ; don't alter col 0
      59    01    D0    07F4           1$:     MOVL    #1, R9                             ; dummy 2nd lower bound
            01    DD    07F7                   PUSHL   #1                                 ; dummy 2nd upper bound
```

```
              1A    11  07F9              BRB     LOOP_2ND_SUBH             ; go loop
                        07FB
                        07FB      ;+
                        07FB      ; There are 2 subscripts.  Put the upper bound for both subscripts on the
                        07FB      ; stack and make sure that the lower bound for both subscripts will start
                        07FB      ; at 1 (do not alter row or col 0)
                        07FB      ;-
                        07FB
                        07FB      INIT_TWO_SUBSH:
           20 AA    DD  07FB              PUSHL   dsc$l_u1_2(R10)                   ; 1st upper bound
           1C AA    DD  07FE              PUSHL   dsc$l_l1_2(R10)                   ; 1st lower bound
              03    14  0801              BGTR    1$                                ; not row 0 or neg, do cols
         6E   01    D0  0803              MOVL    #1, (SP)                          ; start with row 1
      59   28 AA    D0  0806      1$:     MOVL    dsc$l_u2_2(R10), R9               ; 2nd upper bound
           24 AA    DD  080A              PUSHL   dsc$l_l2_2(R10)                   ; 2nd lower bound
              03    14  080D              BGTR    LOOP_TST_SUBH             ; not col 0, go loop
         6E   01    D0  080F              MOVL    #1, (SP)                          ; start with col 1
                        0812
                        0812      ;+
                        0812      ; Loop through all the rows.  Row and column upper and lower bounds have been
                        0812      ; initialized on the stack.
                        0812      ;-
                        0812
                        0812      LOOP_1ST_SUBH:
         5B   6E    D0  0812              MOVL    lower_bnd2(SP), R11               ; R11 has 2nd lower bound
                        0815
                        0815      ;+
                        0815      ; Loop through all the elements (columns) of the current row.  Column lower
                        0815      ; bound is initialized in R11.  Column upper bound is on the stack.
                        0815      ; Distinguish array by data type so that the correct store routine can be
                        0815      ; called and the constant can be converted to the correct type.
                        0815      ;-
                        0815
                        0815      LOOP_2ND_SUBH:
                        0815
      50   24 AE  70FD  0815              MOVH    constant_cvt(SP), R0      ; put constant into R0
                        081A                                                        ;  R0 & R1 for double
                        081A      ;+
                        081A      ; When passed by value, hfloat takes 4 words, gfloat and double take 2 words,
                        081A      ; and all other data types take 1 longword.
                        081A      ;-
                        081A
                        081A              .IF     IDN     H, H              ; data type is hfloat
         54   5A    D0  081A              MOVL    R10, R4                           ; pointer to array desc
      55   04 AE    D0  081D              MOVL    lower_bnd1(SP), R5                ; current row
         56   5B    D0  0821              MOVL    R11, R6                           ; current column
                        0824              .IFF
                        0824              .IF     IDN     H, G              ; data type is gfloat
                        0824              MOVL    R10, R2                           ; pointer to array desc
                        0824              MOVL    lower_bnd1(SP), R3                ; current row
                        0824              MOVL    R11, R4                           ; current column
                        0824              .IFF
                        0824              .IF     IDN     H, D              ; data type is double
                        0824              MOVL    R10, R2                           ; pointer to array desc
                        0824              MOVL    lower_bnd1(SP), R3                ; current row
                        0824              MOVL    R11, R4                           ; current column
                        0824              .IFF                                      ; all other data types
```

```
                                          0824            MOVL     R10, R1                         ; pointer to array desc
                                          0824            MOVL     lower_bnd1(SP), R2              ; current row
                                          0824            MOVL     R11, R3                         ; current column
                                          0824            .ENDC
                                          0824            .ENDC
                                          0824            .ENDC
                        14 AE    50 70FD  0824            MOVH     R0, data(SP)            ; store value in value_desc
                                          0829            STORE    H                               ; store in array
                                          0829            .IF      IDN     H, H
                        18    02 A4    91  0829            CMPB     dsc$b_dtype(R4), #dsc$k_dtype_dsc
                                 41    12  082D            BNEQ     30159$
                        50    04 A4    D0  082F            MOVL     4(R4), R0
                     0E AE    02 A0    90  0833            MOVB     dsc$b_dtype(R0), dtype(SP)
                     0F AE    03 A0    90  0838            MOVB     dsc$b_class(R0), class(SP)
                     10 AE    14 AE    DE  083D            MOVAL    data(SP), pointer (SP)
                        0C AE    0A    B0  0842            MOVW     #10, str_len(SP)
                        01    0B A4    91  0846            CMPB     dsc$b_dimct(R4), #1
                                 11    12  084A            BNEQ     30161$
                                 55    DD  084C            PUSHL    R5
                                 54    DD  084E            PUSHL    R4
                              14 AE    DF  0850            PUSHAL   value_desc+8(SP)
                  00000000'GF    03    FB  0853            CALLS    #3,G^BAS$STORE_BFA
                               00A1    31  085A            BRW      30158$
                                 56    DD  085D    30161$: PUSHL    R6
                                 55    DD  085F            PUSHL    R5
                                 54    DD  0861            PUSHL    R4
                              18 AE    DF  0863            PUSHAL   value_desc+12(SP)
                  00000000'GF    04    FB  0866            CALLS    #4,G^BAS$STORE_BFA
                               008E    31  086D            BRW      30158$
                     BF 8F    03 A4    91  0870    30159$: CMPB     dsc$b_class(R4), #dsc$k_class_bfa
                                 09    12  0875            BNEQ     30150$
                        00000000'GF    16  0877            JSB      G^BAS$STO_FA_H_R8
                               007E    31  087D            BRW      30158$
                     3E 0A A4    05    E0  0880    30150$: BBS      #5, 10(R4), 30151$
                        01    0B A4    91  0885            CMPB     dsc$b_dimct(R4), #1
                                 17    12  0889            BNEQ     30160$
                           58    64    3C  088B            MOVZWL   dsc$w_length(R4), R8
     00    58   1C A4   18 A4    55    0A  088E            INDEX    R5, dsc$l_l1_1(R4), dsc$l_u1_1(R4), R8, #0, R7
                                 57        0896
                        57    10 A4    C0  0897            ADDL     dsc$a_a0(R4), R7
                           67    50 70FD  089B            MOVH     R0, (R7)
                               005C    31  089F            BRW      30158$
        18 A4   20 A4   1C A4    55    0A  08A2    30160$: INDEX    R5, dsc$l_l1_2(R4), dsc$l_u1_2(R4), dsc$l_m2(R4), #0, R7
                           57    00        08AA
                           58    64    3C  08AC            MOVZWL   dsc$w_length(R4), R8
     57    58   28 A4   24 A4    56    0A  08AF            INDEX    R6, dsc$l_l2_2(R4), dsc$l_u2_2(R4), R8, R7, R7
                                 57        08B7
                        57    10 A4    C0  08B8            ADDL     dsc$a_a0(R4), R7
                           67    50 70FD  08BC            MOVH     R0, (R7)
                               003B    31  08C0            BRW      30158$
                        01    0B A4    91  08C3    30151$: CMPB     dsc$b_dimct(R4), #1
                                 17    12  08C7            BNEQ     30162$
                           58    64    3C  08C9            MOVZWL   dsc$w_length(R4), R8
     00    58   1C A4   18 A4    56    0A  08CC            INDEX    R6, dsc$l_l1_1(R4), dsc$l_u1_1(R4), R8, #0, R7
                                 57        08D4
                        57    10 A4    C0  08D5            ADDL     dsc$a_a0(R4), R7
                           67    50 70FD  08D9            MOVH     R0, (R7)
```

```
                          001E    31 08DD          BRW     30158$
   14 A4    28 A4    24 A4    56    0A 08E0  30162$: INDEX   R6, dsc$l_l2_2(R4), dsc$l_u2_2(R4), dsc$l_m1(R4), #0, R7
                          57    00      08E8
                          58    64    3C 08EA          MOVZWL  dsc$w_length(R4), R8
 57    58    20 A4    1C A4    55    0A 08ED          INDEX   R5, dsc$l_l1_2(R4), dsc$l_u1_2(R4), R8, R7, R7
                                57      08F5
                    57    10 A4    C0 08F6          ADDL    dsc$a_a0(R4), R7
                          67    50  70FD 08FA          MOVH    R0, (R7)
                                        08FE          .IFF
                                        08FE          .IF     IDN     H, G
                                        08FE          CMPB    dsc$b_dtype(R2), #dsc$k_dtype_dsc
                                        08FE          BNEQ    30163$
                                        08FE          MOVL    4(R2), R0
                                        08FE          MOVB    dsc$b_dtype(R0), dtype(SP)
                                        08FE          MOVB    dsc$b_class(R0), class(SP)
                                        08FE          MOVAL   data(SP), pointer (SP)
                                        08FE          MOVW    #10, str_len(SP)
                                        08FE          CMPB    dsc$b_dimct(R2), #1
                                        08FE          BNEQ    30165$
                                        08FE          PUSHL   R3
                                        08FE          PUSHL   R2
                                        08FE          PUSHAL  value_desc+8(SP)
                                        08FE          CALLS   #3,G^BAS$STORE_BFA
                                        08FE          BRW     30158$
                                        08FE  30165$: PUSHL   R4
                                        08FE          PUSHL   R3
                                        08FE          PUSHL   R2
                                        08FE          PUSHAL  value_desc+12(SP)
                                        08FE          CALLS   #4,G^BAS$STORE_BFA
                                        08FE          BRW     30158$
                                        08FE  30163$: CMPB    dsc$b_class(R2), #dsc$k_class_bfa
                                        08FE          BNEQ    30152$
                                        08FE          JSB     G^BAS$STO_FA_H_R8
                                        08FE          BRW     30158$
                                        08FE  30152$: BBS     #5, 10(R2), 30153$
                                        08FE          CMPB    dsc$b_dimct(R2), #1
                                        08FE          BNEQ    30164$
                                        08FE          MOVZWL  dsc$w_length(R2), R6
                                        08FE          INDEX   R3, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                                        08FE          ADDL    dsc$a_a0(R2), R5
                                        08FE          MOVH    R0, (R5)
                                        08FE          BRW     30158$
                                        08FE  30164$: INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), dsc$l_m2(R2), #0, R5
                                        08FE          MOVZWL  dsc$w_length(R2), R6
                                        08FE          INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), R6, R5, R5
                                        08FE          ADDL    dsc$a_a0(R2), R5
                                        08FE          MOVH    R0, (R5)
                                        08FE          BRW     30158$
                                        08FE  30153$: CMPB    dsc$b_dimct(R2), #1
                                        08FE          BNEQ    30166$
                                        08FE          MOVZWL  dsc$w_length(R2), R6
                                        08FE          INDEX   R4, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
                                        08FE          ADDL    dsc$a_a0(R2), R5
                                        08FE          MOVH    R0, (R5)
                                        08FE          BRW     30158$
                                        08FE  30166$: INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), dsc$l_m1(R2), #0, R5
                                        08FE          MOVZWL  dsc$w_length(R2), R6
```

```
     08FE                    INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), R6, R5, R5
     08FE                    ADDL    dsc$a_a0(R2), R5
     08FE                    MOVH    R0, (R5)
     08FE                    .IFF
     08FE                    .IF     IDN     H, D
     08FE                    CMPB    dsc$b_dtype(R2), #dsc$k_dtype_dsc
     08FE                    BNEQ    30167$
     08FE                    MOVL    4(R2), R0
     08FE                    MOVB    dsc$b_dtype(R0), dtype(SP)
     08FE                    MOVB    dsc$b_class(R0), class(SP)
     08FE                    MOVAL   data(SP), pointer (SP)
     08FE                    MOVW    #10, str_len(SP)
     08FE                    CMPB    dsc$b_dimct(R2), #1
     08FE                    BNEQ    30169$
     08FE                    PUSHL   R3
     08FE                    PUSHL   R2
     08FE                    PUSHAL  value_desc+8(SP)
     08FE                    CALLS   #3,G^BAS$STORE_BFA
     08FE                    BRW     30158$
     08FE          30169$:   PUSHL   R4
     08FE                    PUSHL   R3
     08FE                    PUSHL   R2
     08FE                    PUSHAL  value_desc+12(SP)
     08FE                    CALLS   #4,G^BAS$STORE_BFA
     08FE                    BRW     30158$
     08FE          30167$:   CMPB    dsc$b_class(R2), #dsc$k_class_bfa
     08FE                    BNEQ    30154$
     08FE                    JSB     G^BAS$STO_FA_H_R8
     08FE                    BRW     30158$
     08FE          30154$:   BBS     #5, 10(R2), 30155$
     08FE                    CMPB    dsc$b_dimct(R2), #1
     08FE                    BNEQ    30168$
     08FE                    MOVZWL  dsc$w_length(R2), R6
     08FE                    INDEX   R3, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
     08FE                    ADDL    dsc$a_a0(R2), R5
     08FE                    MOVH    R0, (R5)
     08FE                    BRW     30158$
     08FE          30168$:   INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), dsc$l_m2(R2), #0, R5
     08FE                    MOVZWL  dsc$w_length(R2), R6
     08FE                    INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), R6, R5, R5
     08FE                    ADDL    dsc$a_a0(R2), R5
     08FE                    MOVH    R0, (R5)
     08FE                    BRW     30158$
     08FE          30155$:   CMPB    dsc$b_dimct(R2), #1
     08FE                    BNEQ    30170$
     08FE                    MOVZWL  dsc$w_length(R2), R6
     08FE                    INDEX   R4, dsc$l_l1_1(R2), dsc$l_u1_1(R2), R6, #0, R5
     08FE                    ADDL    dsc$a_a0(R2), R5
     08FE                    MOVH    R0, (R5)
     08FE                    BRW     30158$
     08FE          30170$:   INDEX   R4, dsc$l_l2_2(R2), dsc$l_u2_2(R2), dsc$l_m1(R2), #0, R5
     08FE                    MOVZWL  dsc$w_length(R2), R6
     08FE                    INDEX   R3, dsc$l_l1_2(R2), dsc$l_u1_2(R2), R6, R5, R5
     08FE                    ADDL    dsc$a_a0(R2), R5
     08FE                    MOVH    R0, (R5)
     08FE                    .IFF
     08FE                    CMPB    dsc$b_dtype(R1), #dsc$k_dtype_dsc
```

```
                                         08FE               BNEQ    30171$
                                         08FE               MOVL    4(R1), R0
                                         08FE               MOVB    dsc$b_dtype(R0), dtype(SP)
                                         08FE               MOVB    dsc$b_class(R0), class(SP)
                                         08FE               MOVAL   data(SP), pointer (SP)
                                         08FE               MOVW    #10, str_len(SP)
                                         08FE               CMPB    dsc$b_dimct(R1), #1
                                         08FE               BNEQ    30173$
                                         08FE               PUSHL   R2
                                         08FE               PUSHL   R1
                                         08FE               PUSHAL  value_desc+8(SP)
                                         08FE               CALLS   #3,G^BAS$STORE_BFA
                                         08FE               BRW     30158$
                                         08FE       30173$: PUSHL   R3
                                         08FE               PUSHL   R2
                                         08FE               PUSHL   R1
                                         08FE               PUSHAL  value_desc+12(SP)
                                         08FE               CALLS   #4,G^BAS$STORE_BFA
                                         08FE               BRW     30158$
                                         08FE       30171$: CMPB    dsc$b_class(R1), #dsc$k_class_bfa
                                         08FE               BNEQ    30156$
                                         08FE               JSB     G^BAS$STO_FA_H_R8
                                         08FE               BRW     30158$
                                         08FE       30156$: BBS     #5, 10(R1), 30157$
                                         08FE               CMPB    dsc$b_dimct(R1), #1
                                         08FE               BNEQ    30172$
                                         08FE               MOVZWL  dsc$w_length(R1), R5
                                         08FE               INDEX   R2, dsc$l_l1_1(R1), dsc$l_u1_1(R1), R5, #0, R4
                                         08FE               ADDL    dsc$a_a0(R1), R4
                                         08FE               MOVH    R0, (R4)
                                         08FE               BRW     30158$
                                         08FE       30172$: INDEX   R2, dsc$l_l1_2(R1), dsc$l_u1_2(R1), dsc$l_m2(R1), #0, R4
                                         08FE               MOVZWL  dsc$w_length(R1), R5
                                         08FE               INDEX   R3, dsc$l_l2_2(R1), dsc$l_u2_2(R1), R5, R4, R4
                                         08FE               ADDL    dsc$a_a0(R1), R4
                                         08FE               MOVH    R0, (R4)
                                         08FE               BRW     30158$
                                         08FE       30157$: CMPB    dsc$b_dimct(R1), #1
                                         08FE               BNEQ    30174$
                                         08FE               MOVZWL  dsc$w_length(R1), R5
                                         08FE               INDEX   R3, dsc$l_l1_1(R1), dsc$l_u1_1(R1), R5, #0, R4
                                         08FE               ADDL    dsc$a_a0(R1), R4
                                         08FE               MOVH    R0, (R4)
                                         08FE               BRW     30158$
                                         08FE       30174$: INDEX   R3, dsc$l_l2_2(R1), dsc$l_u2_2(R1), dsc$l_m1(R1), #0, R4
                                         08FE               MOVZWL  dsc$w_length(R1), R5
                                         08FE               INDEX   R2, dsc$l_l1_2(R1), dsc$l_u1_2(R1), R5, R4, R4
                                         08FE               ADDL    dsc$a_a0(R1), R4
                                         08FE               MOVH    R0, (R4)
                                         08FE               .ENDC
                                         08FE               .ENDC
                                         08FE               .ENDC
                                         08FE       30158$:
                                         08FE
                                 5B  D6  08FE               INCL    R11                           ; get next column
                            59   5B  D1  0900               CMPL    R11, R9                       ; see if last column done
                                 03  14  0903               BGTR    2$
```

```
               FF0D  31  0905              BRW     LOOP_2ND_SUBH           ; no, continue inner loop
                         0908
                         0908          ;+
                         0908          ; Have completed entire row.  See if it was the last row.  If not,
                         0908          ; continue with next row.
                         0908          ;-
                         0908
              04 AE  D6  0908      2$: INCL    lower_bnd1(SP)                  ; get next row
      08 AE   04 AE  D1  0908          CMPL    lower_bnd1(SP), upper_bnd1(SP)  ; see if last row done
                 03  14  0910          BGTR    3$
               FEFD  31  0912          BRW     LOOP_1ST_SUBH           ; no, continue outer loop
                         0915
                     04  0915      3$: RET                                     ; yes, finished
                         0916
                         0916  384     .END                                    ; end of BAS$MAT_INIT
```

```
BAS$$SCALE_R1                    ********    X    00        INIT_TWO_SUBSH                    000007FB R      02
BAS$$STOP                        ********    X    00        INIT_TWO_SUBSL                    000002F6 R      02
BAS$K_ARGDONMAT                  ********    X    00        INIT_TWO_SUBSW                    000001BA R      02
BAS$K_DATTYPERR                  ********    X    00        LONG                              000002CF R      02
BAS$MAT_INIT                     00000000 RG      02        LOOP_1ST_SUBB                     00000095 R      02
BAS$STORE_BFA                    ********    X    00        LOOP_1ST_SUBD                     00000592 R      02
BAS$STO_FA_B_R8                  ********    X    00        LOOP_1ST_SUBF                     00000449 R      02
BAS$STO_FA_D_R8                  ********    X    00        LOOP_1ST_SUBG                     000006CF R      02
BAS$STO_FA_F_R8                  ********    X    00        LOOP_1ST_SUBH                     00000812 R      02
BAS$STO_FA_G_R8                  ********    X    00        LOOP_1ST_SUBL                     0000030D R      02
BAS$STO_FA_H_R8                  ********    X    00        LOOP_1ST_SUBW                     000001D1 R      02
BAS$STO_FA_L_R8                  ********    X    00        LOOP_2ND_SUBB                     00000098 R      02
BAS$STO_FA_W_R8                  ********    X    00        LOOP_2ND_SUBD                     00000595 R      02
BYTE                             00000057 R       02        LOOP_2ND_SUBF                     0000044C R      02
CLASS                          = 0000000F                   LOOP_2ND_SUBG                     000006D2 R      02
CONSTANT                       = 00000008                   LOOP_2ND_SUBH                     00000815 R      02
CONSTANT_CVT                   = 00000024                   LOOP_2ND_SUBL                     00000310 R      02
DATA                           = 00000014                   LOOP_2ND_SUBW                     000001D4 R      02
DOUBLE                           00000547 R       02        LOWER_BND1                      = 00000004
DSC$A_A0                       = 00000010                   LOWER_BND2                      = 00000000
DSC$B_AFLAGS                   = 0000000A                   MATRIX                          = 00000004
DSC$B_CLASS                    = 00000003                   POINTER                         = 00000010
DSC$B_DIMCT                    = 0000000B                   SF$L_SAVE_FP                    = 0000000C
DSC$B_DTYPE                    = 00000002                   STR_LEN                         = 0000000C
DSC$K_CLASS_BFA                = 000000BF                   UPPER_BND1                      = 00000008
DSC$K_DTYPE_B                  = 00000006                   VALUE_DESC                      = 0000000C
DSC$K_DTYPE_D                  = 0000000B                   WORD                              00000193 R      02
DSC$K_DTYPE_DSC                = 00000018
DSC$K_DTYPE_G                  = 0000001B
DSC$K_DTYPE_H                  = 0000001C
DSC$L_L1_1                     = 00000018
DSC$L_L1_2                     = 0000001C
DSC$L_L2_2                     = 00000024
DSC$L_M1                       = 00000014
DSC$L_M2                       = 00000018
DSC$L_U1_1                     = 0000001C
DSC$L_U1_2                     = 00000020
DSC$L_U2_2                     = 00000028
DSC$V_FL_BOUNDS                = 00000007
DSC$W_LENGTH                   = 00000000
DTYPE                          = 0000000E
ERR_ARGDONMAT                    0000004A R       02
ERR_DATTYPERR                    0000003D R       02
FLOAT                            0000040B R       02
GFLOAT                           00000690 R       02
HFLOAT                           000007D3 R       02
INIT_ONE_SUBB                    0000006C R       02
INIT_ONE_SUBD                    00000569 R       02
INIT_ONE_SUBF                    00000420 R       02
INIT_ONE_SUBG                    000006A6 R       02
INIT_ONE_SUBH                    000007E9 R       02
INIT_ONE_SUBL                    000002E4 R       02
INIT_ONE_SUBW                    000001A8 R       02
INIT_TWO_SUBSB                   0000007E R       02
INIT_TWO_SUBSD                   0000057B R       02
INIT_TWO_SUBSF                   00000432 R       02
INIT_TWO_SUBSG                   000006B8 R       02
```

```
                                              +----------------+
                                              ! Psect synopsis !
                                              +----------------+

PSECT name                      Allocation          PSECT No.  Attributes
----------                      ----------          ---------  ----------
.  ABS  .                       00000000  (    0.)  00 (  0.)  NOPIC     USR     CON     ABS     LCL NOSHR NOEXE NORD   NOWRT NOVEC BYTE
$ABS$                           00000000  (    0.)  01 (  1.)  NOPIC     USR     CON     ABS     LCL NOSHR   EXE   RD     WRT NOVEC BYTE
_BAS$CODE                       00000916  ( 2326.)  02 (  2.)    PIC     USR     CON     REL     LCL   SHR   EXE   RD   NOWRT NOVEC LONG

                                           +------------------------+
                                           ! Performance indicators !
                                           +------------------------+

Phase                      Page faults    CPU Time       Elapsed Time
-----                      -----------    --------       ------------
Initialization                      30    00:00:00.05    00:00:00.55
Command processing                 114    00:00:00.57    00:00:02.69
Pass 1                             374    00:00:07.49    00:00:15.89
Symbol table sort                    0    00:00:00.36    00:00:00.40
Pass 2                             406    00:00:03.56    00:00:08.40
Symbol table output                  1    00:00:00.08    00:00:00.09
Psect synopsis output                1    00:00:00.02    00:00:00.05
Cross-reference output               0    00:00:00.00    00:00:00.00
Assembler run totals               928    00:00:12.13    00:00:28.07

The working set limit was 1800 pages.
107967 bytes (211 pages) of virtual memory were used to buffer the intermediate code.
There were 20 pages of symbol table space allocated to hold 228 non-local and 81 local symbols.
384 source lines were read in Pass 1, producing 18 object records in Pass 2.
30 pages of virtual memory were used to define 10 macros.

                                          +--------------------------+
                                          ! Macro library statistics !
                                          +--------------------------+

Macro library name                        Macros defined
------------------                        --------------
_$255$DUA28:[BASRTL.OBJ]BASRTL.MLB;1                   1
_$255$DUA28:[SYSLIB]STARLET.MLB;2                      5
TOTALS (all libraries)                                 6

436 GETS were required to define 6 macros.

There were no errors, warnings or information messages.

MACRO/ENABLE=SUPPRESSION/DISABLE=(GLOBAL,TRACEBACK)/LIS=LIS$:BASMATINI/OBJ=OBJ$:BASMATINI MSRC$:BASMATINI/UPDATE=(ENH$:BASMATINI)+LI
```

0025 AH-BT13A-SE
VAX/VMS V4.0

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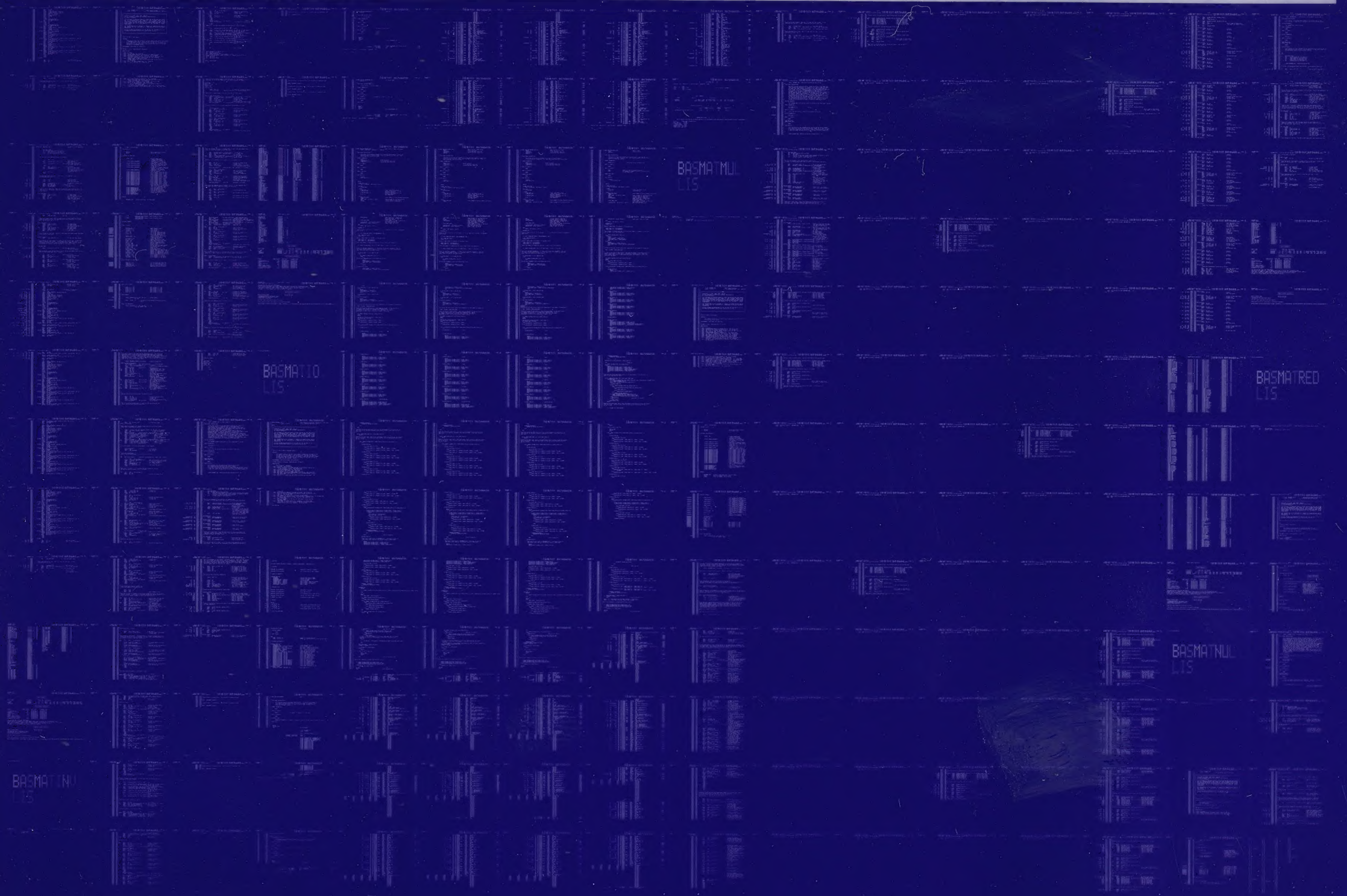

BASMATMUL
LIS

BASMATIO
LIS

BASMATRED
LIS

BASMATNUL
LIS

BASMATINV
LIS